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Adult Elateridae of Southern Alberta, Saskatchewan and Manitoba (Coleoptera)

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by

A. R. BROOKS

Research Station, Research Branch, Canada Department of Agriculture
Saskatoon, Sask.

THE CANADIAN ENTOMOLOGIST

Supplement 20

Accompanies Volume XCII

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Adult Elateridae of Southern Alberta, Saskatchewan and Manitoba (Coleoptera)[1]

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ABSTRACT

Illustrated keys and descriptions of 26 genera and 137 species or subspecies of Elateridae of southern Alberta, Saskatchewan and Manitoba are presented. The distribution of each species is described in relation to the bio-ecological regions in the three Provinces. No new species are described.

INTRODUCTION

Some species of Elateridae, commonly known as wireworms or click beetles, have long been important pests of agricultural crops in the Prairie Provinces (King, 1928; Strickland, 1927). There has been need for proper identifications of the species, and especially of the larvae, since control measures were first attempted. Glen (1935, 1941, 1944, 1950) and Glen, King and Arnason (1943) investigated the morphology and taxonomy of many of the more important larvae. Leconte (1853) revised the North American species, and Hyslop (1921) and Arnett (1955) listed the genera with their genotypes and synonymy. Brown (1930-39), Van Dyke (1932), Lane (1948-1953), Becker (1952, 1956) and Arnett (1952, 1953) revised or reviewed the taxonomy of the adults of several genera containing prairie species.

The Forest Insect Survey, inaugurated by the Division of Forest Biology in 1936, and a prairie insect survey, inaugurated by the Division of Entomology in 1949, have been instrumental in collecting large numbers of adult elaterids in the Prairie Provinces. These, and additional surveys for pest species in newly developed agricultural areas, have nearly doubled the number of species that were previously reported.

The present study was undertaken to provide illustrated keys and descriptions of the adult elaterids and to summarize the available information on the distributions of the species in this area.

ECONOMIC IMPORTANCE

The economic importance of the Elateridae depends almost entirely on the larvae. The adults of *Ctenicera glauca* (Germ.) are leaf-feeders, and in company with various Meloidae, sometimes do considerable damage to the foliage of beans and alfalfa. The adults of other species appear to eat very little.

Glen, King and Arnason (1943) and Glen (1950) identified the wireworms of economic importance in Canada. In the Prairie Provinces *Ctenicera destructor* (Bn.) and *Hypolithus bicolor* Esch. are the outstanding species destructive to field and garden crops in the grassland areas. *Ctenicera aeripennis* (Kby.), *C. morula* (LeC.) and *Hypolithus bicolor* Esch. are the main species destructive to crops in the forest areas. *Limonius californicus* (Mann.) is of economic importance in the irrigated areas of southern Alberta, and in saline habitats in a number of localities in southern Saskatchewan and southwestern Manitoba. Minor species, sometimes of local importance, include: *Oestodes puncticollis* Horn in

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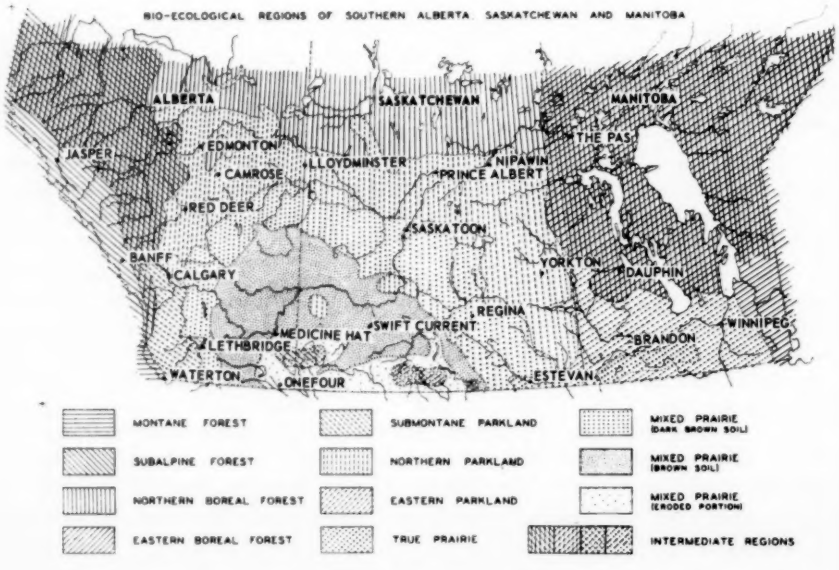
saline fields; *Agriotes criddlei* V.D., *Ctenicera sexualis* (Bn.), and *C. glauca* (Germ.) in the mixed prairie of southern Saskatchewan and Alberta; *Limonius pectoralis* LeC., *Ctenicera kendalli* (Kby.), and *Agriotes limosus* (LeC.) in newly cleared forest areas; and *Agriotes mancus* (Say), *Melanotus castanipes* (Payk.), *M. fissilis* (Say), *Aeolus mellillus* (Say) and *Hypolithus abbreviatus* (Say), in parkland areas, chiefly of southern Manitoba.

Morris (1951) identified a number of species that are predators of European spruce sawfly pupae in Eastern Canada. Nearly 90 per cent of the larvae collected in his study in New Brunswick were of species of *Ctenicera*, and over half were of *C. triundulata* (Rand.) and *C. nitidula* (LeC.). Other species included *Ctenicera resplendens aeraria* (Rand.), *C. propola* (LeC.), *C. appropinquans* (Rand.), *C. hieroglyphica* (Say), *C. mediana* (Germ.), *C. appressa* (Rand.), *Eanus decoratus* (Mann.), *Athous rufifrons* (Rand.), *Agriotes limosus* (LeC.), *Sericus honestus* (Rand.) and several unidentified species of *Ctenicera*, *Ampedus* and *Dalopius*. Morris stated that his studies revealed no specific differences in food habits, and that all members of the family inhabiting spruce litter may be treated as a single group. In comparison with small-mammal predators, larval Elateridae played only a minor role in the control of the sawfly.

ECOLOGICAL AREAS AND DISTRIBUTION

The physiography, climate, soils and vegetation of Canada were described by Munroe (1956). In general, the distributions of insects coincide closely with vegetation and soil zones. In the Prairie Provinces some modifications of the usually accepted "life zones" or "ecological provinces" appear necessary to account for insect distributions.

The associations of elaterid species in the Prairie Provinces are very similar to the associations of acridoid species (Brooks, 1958), and approximately the same distributional tendencies of the associations and species were observed.



The association to which a species is assigned in the following list is based either on the presence of the species in the region or group of regions and its absence in other regions, *or* on a general and widespread distribution in the assigned region with only occasional and widely scattered occurrence in atypical communities of adjacent regions.

Coniferous Forest Formation

Montane and Subalpine Forest Regions: Mountains and foothills of western Alberta; intergrading in a broad zone with the boreal forests of north-central Alberta.

Elaterid species: *Ctenicera bipunctata* (Bn.), *C. bombycina* (Germ.), *C. columbiana* (Bn.), *C. crestonensis* (Bn.), *C. nebraskensis* (Bland), *C. resplendens resplendens* (Esch.), *C. semimetallica* (Wlk.), *C. silvatica* (V.D.), *C. umbricola* (Esch.), *C. vidua* (Bn.), *C. laricis* (Bn.), *Hypolithus glacialis* (V.D.), *H. squalidus* (LeC.), *Limonius rufihumeralis* Lane, *L. nitidulus* Horn, *Eanus albertanus* Bn., *Athous rufiventris* (Esch.), *Lacon brevicornis profusus* (Cand.), *Agriotes tardus* Bn., *A. opaculus* (LeC.), *Ampedus moerens* (LeC.), and *A. hoppingi* (V.D.).

Boreal Forest Region (western part): The forested area from the foothills of western Alberta, eastward through northern Saskatchewan and Manitoba, into eastern Canada. There is some evidence from insect distribution that this region does not extend east of the Saskatchewan-Manitoba boundary, at least in the southern part of the range. Very little is known of the populations of elaterids in the region, and many of the species that occur there may actually be components of other forest associations.

Elaterid species: *Ctenicera kendalli* (Kby.), *C. triundulata* (Rand.), *C. mediana* (Germ.), *C. ochreipennis* (LeC.), *C. hoppingi* (V.D.), *C. propola* (LeC.), *C. nigricollis* (Bland), *C. morula* (LeC.), *C. splendens* (Zieg.), *C. aeripennis* (Kby.), *C. nitidula* (LeC.), *C. arata* (LeC.), *C. mendax* (LeC.), *C. lutescens* (Fall), *Eanus decoratus* (Mann.), *E. estriatus* (LeC.), *Denticollis denticornis* (Kby.), *D. productus* (Rand.), *Pityobius anguinus* LeC., *Drasterius debilis* LeC., *Lacon brevicornis* (LeC.), *L. obtectus* (Say), *L. auroratus* (Say), *Sericus brunneus* (LeC.), *Agriotes limosus* (LeC.), *Ampedus pullus* Germ., *A. evansi* Bn., *A. sanguinipennis* (Say), *A. mixtus* (Hbst.), *A. laurentinus* Bn., *A. nigrinus* (Hbst.) and *A. quebecensis* Bn.

Boreal Forest Region (eastern part) and Great Lakes-St. Lawrence Forest Region: Southeastern Manitoba; intergrading with the western boreal forest northwestward to the Saskatchewan-Manitoba boundary.

Elaterid species: *Ctenicera rufopleuralis* (Fall), *C. appropinquans* (Rand.), *C. spinosa* (LeC.), *C. cuprascens* (LeC.), *Limonius aurifer* LeC., *Athous rufifrons* (Rand.), *Alaus myops* (Fabr.), *Melanotus leonardi* (LeC.), *Agriotes pubescens* Melsh., *A. quebecensis* Bn., *Agriotella bigeminata* (Rand.), *Ampedus collaris* (Say), *A. melsheimeri* (Leng) and *Cardiophorus gagates* Erich.

Grassland Formation

True Prairie Region and Eastern Parkland Region: Manitoba, south and west of the forest; extending a few miles into Saskatchewan in the valleys of the Souris, Qu'Appelle and Assiniboine rivers.

Elaterid species: *Ctenicera hieroglyphica* (Say), *C. sulcicollis* (Say), *Limonius anceps* LeC., *Hemicrepidius brevicollis* Cand., *Melanotus castanipes* (Payk.), *M. fissilis* (Say), *Agriotes mancus* (Say), *A. stabilis* (LeC.), *Dalopius vernus* Bn., *D. vagus* Bn. and *Oxygonus obesus* (Say)?

Mixed Prairie Region: The brown and dark-brown soil zones of southern Alberta and Saskatchewan; extending into southwestern Manitoba in the valleys of the Souris, Qu'Appelle, and Assiniboine rivers. The southernmost, eroded, portion of the area appears to contain many characteristic floral and faunal elements, and may represent a distinct subdivision of the mixed prairie.

Elaterid species: *Ctenicera destructor* (Bn.), *C. sexualis* (Bn.), *C. glauca* (Germ.), *Hypolithus bicolor* Esch., *Limonius californicus* (Mann.), *L. lanei* V.D., *Limonius* sp. A., *Hemicrepidius memmonius* (Hbst.), *H. carbonatus* LeC., *Anchastus cinereipennis* (Esch.), *Conoderus auritus* (Hbst.), *Aeolus mellillus* (Say), *Negastrius pectoralis* (Say), *N. choris* (Say), *N. dubius* (Horn), *Oestodes puncticollis* Horn, *Dalopius pallidus* Bn., *Agriotes criddlei* V.D. and *Cardiophorus tenebrosus* LeC.

Submontane Parkland Region: Southwestern Alberta adjacent to the montane and southern subalpine forest regions; mostly localized in river valleys, and extending far eastward in the valley of the South Saskatchewan River; also present in diluted form and mixed with other associations in the Cypress Hills and Wood Mountains of southern Saskatchewan.

Elaterid species: *Ctenicera pudica* (Bn.), *Hypolithus funebris* Cand., *Limonius ursinus* V.D., *L. canus* LeC., *Athous nigropilis* Mots., *Hemicrepidius* sp. A., *Negastrius gentilis* (LeC.), *N. striatulus* (LeC.), *Negastrius* sp. A., *Dalopius fucatus* Bn., *D. insolens* Bn., *Agriotes ferrugineipennis* (LeC.), *Agriotella occidentalis* Bn., *Cardiophorus pubescens* Blanch., *C. tumidicollis* LeC. and *C. montanus* Bland.

Northern Parkland Region (Fescue Grassland Region and allied associations): Occurs in a broad belt adjacent to the western boreal foest, and in a number of isolated "islands" within the mixed prairie or predominantly submontane parkland (Cypress Hills, Wood Mountains, Moose Mountains, Great Sand Hills, Elbow Forest Reserve, Sask.) and within the forest (Peace River, Wood Buffalo National Park, Alta.).

Elaterid species: *Ctenicera pygmaea* (V.D.), *C. stricklandi* (Bn.), *Ctenicera* sp. A., *C. cruciata* (L.), *C. resplendens aeraria* (Rand.), *C. limoniiformis* (Horn), *Hypolithus abbreviatus* (Say), *Limonius aeger* LeC., *L. pectoralis* LeC., *Oedostethus femoralis* LeC., *Negastrius tumescens* (LeC.), *Dalopius asellus* Bn., *D. mirabilis* Bn., *D. parvulus* Bn., *Agriotes fucosus* (LeC.), *Megapenthes stigmosus* (LeC.), *Ampedus sellatus* Germar, *A. apicatus* (Say), *A. luctuosus* (LeC.) and *A. subtilis* (LeC.).

NOTES ON TEXT AND ILLUSTRATIONS

Morphological terms: The morphological terms used in the keys and descriptions are illustrated (Figs. 1-5).

Distribution: The distributional information is based on specimens I have examined. Distributions are described in general terms where adequate collections were available, and in specific terms where only a few records were available. The ecological regions mentioned in the statements of distributions are those adopted by Brooks (1958) for the Acridoidea (Map 1).

Illustrations: The illustrations are not drawn to the same scale throughout the work. Comparable structures within one genus, however, are drawn to the same scale.

Arrangement of genera and species: No attempt has been made in this summary to arrange the genera and species following any taxonomic (i.e. phyletic)

system. Genera and species within genera that are similar in general appearance are placed together for ready comparison. The genera *Ctenicera*, *Hypolithus* and *Limonius*, which contain most of our economic species, are treated first for convenience to economic entomologists.

Identifications: The species have been identified, for the most part, by reference to specimens in the Canadian National Collection, Ottawa, determined and arranged by W. J. Brown and E. C. Becker. Mr. M. C. Lane determined the species of *Hemicrepidius*, *Limonius*, *Cardiophorus* and individual species in other genera.

CLASSIFICATION

Leng (1920) recognized three subfamilies and 12 tribes of Elateridae in North America: Cardiophorinae, Elaterinae and Pyrophorinae. Hyslop (1917), working with both adults and larvae, separated the family into three subfamilies which he subdivided into ten well-defined tribes and several other provisional tribes. The genus *Oestodes* Horn, placed in the Pyrophorinae by Leng, is frequently considered to represent a fourth subfamily, Oestodinae (Boving and Craighead, 1931; Glen, 1950), chiefly on the basis of larval characters. Bradley (1930) recognized 20 subfamilies in the family.

In the Prairie Provinces the subfamilies (Leng) are represented by the following genera: Cardiophorinae, *Cardiophorus* Esch.; Elaterinae, *Drasterius* Esch., *Ampedus* Dej., *Megapenthes* Kies., *Dalopius* Esch., *Agriotes* Esch., *Agriotella* Bn., *Anchastus* LeC., *Melanotus* Esch., *Sericus* Esch., and *Oxygonus* LeC.; and *Pyrophorinae*, all other genera.

In North America nearly 800 species in about 65 genera have been described. In the study area 137 species or subspecies in 26 genera have been collected.

Key to Genera

1. Pronotum with a pair of velvety eye spots ..... *Alaus* Esch. p. 38
   Pronotum without velvety eye spots 2
2. Antennae received in deep sternopleural grooves (Fig. 22); insect covered with scales ..... *Lacon* Laporte. p. 39
   Antennae not received in deep sternopleural grooves; insect without scales 3
3. Tarsal claws pectinate (Fig. 17); over 8.0 mm. long ..... *Melanotus* Esch. p. 40
   Tarsal claws not pectinate 4
4. Head with a conspicuous depression behind the elevated anterior margin (Fig. 6) 5
   Head without a depression behind the anterior margin 7
5. Antennae 12-segmented, pectinate in the male; more than 25 mm. long ..... *Pityobius* LeC. p. 34
   Antennae 11-segmented, not pectinate; less than 20 mm. long 6
6. Metasternum pointed in front; anterior lobe of prosternum short and truncate ..... *Denticollis* P. and M. p. 33
   Metasternum truncate in front; anterior lobe of prosternum long, the anterior margin broadly rounded ..... *Athous* Esch. p. 32
7. Lateral margin of pronotum without a carina separating dorsal and pleural portions; scutellum heart-shaped ..... *Cardiophorus* Esch. p. 53
   Lateral margin of pronotum with a carina separating dorsal and pleural portions; scutellum oval or oblong 8
8. Lateral margin of pronotum meeting sternopleural suture anteriorly (Fig. 24) 9
   Lateral margin of pronotum separated from sternopleural suture anteriorly (Fig. 23) 11
9. Supra-antennal margin of front not complete, the margin without carina at center (Fig. 10) ..... *Agriotes* Esch. p. 44
   Supra-antennal margin of front complete (Fig. 9) 10
10. Third tarsal segment with a prominent, membranous lobe ventrally *Anchastus* LeC. p. 41
    Third tarsal segment without a membranous lobe below ..... *Agriotella* Bn. p. 47
11. Hind margin of propleuron projected as a broad triangular tooth (Fig. 19); meso- and metapleuron meeting to enclose mesocoxal cavities; length 2.0-5.0 mm. 12

Hind margin of propleuron at most with slight angulate projections; meso- and metapleuron not meeting to enclose mesocoxal cavities 13

12. Tarsal claws each with a low basal tooth (Fig. 13) ..... *Oedostethus* LeC. p. 36
Tarsal claws without basal teeth ..... *Negastrius* Thom. p. 36

13. Tarsal claws each with a large, rectangular, basal tooth (Fig. 15) ..... *Oxygonus* LeC. p. 30
Tarsal claws without basal teeth 14

14. Hind coxal plate rectangular, nearly as wide laterally as medially ..... *Sericus* Esch. p. 41
Hind coxal plate broader at the base of the legs 15

15. Hind coxal plate abruptly expanded toward inside near inner third, the free angle approaching 90 degrees (Fig. 4); prosternal suture not excavate in front; prosternal sutures usually curved outwardly 16
Hind coxal plate more gradually expanded toward inside, the free angle clearly obtuse, *or* prosternal suture definitely excavate in front; prosternal sutures usually curved inwardly 19

16. Fourth tarsal segment with a small membranous lobe ventrally; pronotum with a pair of dark markings ..... *Conoderus* Esch. p. 34
Fourth tarsal segment without a lobe ventrally; pronotum with central dark mark, or none 17

17. Hind angle of pronotum without a carina; small brownish black species ..... *Drasterius* Esch. p. 34
Hind angle of pronotum with carina 18

18. Pronotum reddish yellow with a variable median dark spot; tarsal claws each with a bristle at the basal third (Fig. 16) ..... *Aeolus* Esch. p. 35
Pronotum black; tarsal claws without bristles ..... *Hypolithus* Esch. p. 24

19. Tarsal segments with conspicuous membranous pads ventrally (Fig. 11) ..... *Hemicrepidius* Germ. p. 31
Tarsal segments without membranous pads ventrally 20

20. Scutellum smooth and shiny, virtually hairless; elytra translucent yellow, without distinct striae ..... *Oestodes* LeC. p. 40
Scutellum distinctly punctate or pubescent; elytra opaque 21

21. Head oblique or depressed in front; mouth anterior (Fig. 7) 22
Head rounded in front; mouth inferior (Fig. 8) 24

22. Prosternal spine broadened behind coxae, the coxal cavities nearly closed behind; margin of front elevated behind labrum (Fig. 21) ..... *Limonius* Esch. p. 27
Prosternal spine not broadened behind coxae, the coxal cavity broadly open behind; margin of front not elevated behind labrum 23

23. Elytral striae obliterated or nearly obliterated on the disk; prosternal spine short, about as long as height of eye ..... *Eanus* LeC. p. 26
Elytral striae distinct on the disk (feeble in *lutescens*); prosternal spine much longer than height of eye ..... *Ctenicera* Latr. p. 10

24. Prosternal suture not excavate in front; small black species with distinctive elytral pattern (Figs. 89-91) ..... *Megapenthes* Kies. p. 48
Prosternal suture excavate in front; color pattern not as above 25

25. Excavation of prosternal suture definite, limited by a ridge laterally; sides of pronotum not nearly parallel, obviously convergent in front ..... *Ampedus* Dej. p. 48
Excavation of prosternal suture indefinite, broad and flat and without a limiting ridge laterally; sides of pronotum nearly parallel, hardly convergent in front ..... *Dalopius* Esch. p. 41

DESCRIPTIONS OF GENERA AND SPECIES

Genus *Ctenicera* Latreille

Anterior part of front depressed in the center and sloping down to the clypeus, the margin not rimlike. Thorax somewhat depressed, the sides from nearly parallel to strongly convergent in front; carina of hind angle present or absent; prosternal suture excavate in front or not; hind coxal plate gradually widened to the inside; prosternal spine long, straight or gently curved. Elytral striae usually well defined. Tarsal segments simple or with small felty pads beneath; claws simple.

Brown (1935-1939) recognized a number of species groups in the material he revised, and the groups have been substantiated for the most part by larval characters (Glen, 1950).

The species were formerly placed in the genus *Corymbites* Latr., 1834, a synonym of *Ctenicera*, or in *Ludius* Esch., 1829 (a name preoccupied by *Ludius* Berthold, 1827, a synonym of *Elater* L.) also a synonym of *Ctenicera* (Lane 1948: 179).

Van Dyke (1932: 389) published a key to the species, and Brown (1935, 1936, 1939) revised a number of species groups.

Key to Species

1. Basal margin of pronotum with small incisure on each side (Fig. 3); sides of pronotum parallel, or convergent in front 2
   Basal margin of pronotum without small incisure on each side (Fig. 27); sides of pronotum gradually broadening toward front; flattened, reddish species over 13.0 mm. long ..... 1. *sulcicollis* (Say)
2. Third antennal segment similar to the fourth in shape and type of pubescence 3
   Third antennal segment not similar to the fourth 11
3. Pronotum with conspicuous median sulcus; antenna pectinate in the male, subpectinate in the female; elytra pale with elongate apical spots, or wholly purple ..... 2. *kendalli* (Kby.)
   Pronotum without conspicuous median depression; antenna at most serrate 4
4. Hind angle of pronotum without carina ..... 3. *pygmaea* (V.D.)
   Hind angle of pronotum with carina 5
5. Antenna serrate, the segments beyond the third about as broad as long; carina of pronotal angle obtuse and feeble 6
   Antenna not serrate, the segments about two-thirds as broad as long; carina of pronotal angle sharp 7
6. Pronotum and ventral surface black with metallic sheen; antenna black or dark brown ..... 4. *cuprascens* (LeC.)
   Pronotum and ventral surface shiny black with reddish margins; antenna mostly reddish brown ..... 5. *sp. A*
7. Third antennal segment slightly shorter than fourth, more trumpet-shaped, shiny; elytral intervals shiny, very sparsely and unevenly punctulate or rugulose ..... 10. *sylvatica* (V.D.)
   Third antennal segment a little longer than fourth, not shiny; elytral intervals evenly punctulate with two to four rows of distinct punctures (*volitans* group of Brown) ... 8
8. Elytra reddish yellow, or brownish ..... 6. *spinosa* (LeC.)
   Elytra black 9
9. Hind angle of pronotum conspicuously red both above and below ..... 7. *umbricola* (Esch.)
   Hind angle of pronotum black 10
10. Paramere of male widened apically; length 11.0-15.0 mm. ..... 8. *stricklandi* (Bn.)
    Paramere of male narrow; length 14.0-18.0 mm. ..... 9. *crestonensis* (Bn.)
11. Elytra yellow, reddish, or brown often with distinct pattern 12
    Elytra and pronotum black or metallic 27
12. Pronotum and elytra virtually bare; pronotum reddish, the lateral margins and broad central line black (*cruciata* group of Brown) ..... 25. *cruciata* (L.)
    Pronotum and elytra conspicuously haired 13
13. Posterior margin of propleuron not emarginate next outer angle (Fig. 34) 14
    Posterior margin of propleuron emarginate next outer angle (Fig. 35) 18
14. Elytron with three inverted, V-shaped, dark markings (*triundulata* group of Brown) 15
    Elytron without color pattern (*fallax* group of Brown) 16
15. Third antennal segment two-thirds as long as the fifth; second and third antennal segments together as long as the fourth in the male, a little longer in the female ..... 28. *triundulata* (Rand.)
    Third antennal segment equal to the fifth; second and third antennal segments together longer than the fourth in both sexes ..... 29. *nebraskensis* (Bland)
16. Vestiture of elytra distinctly whorled (Fig. 42) 17
    Vestiture of elytra not distinctly whorled (Fig. 43) ..... 30. *mediana* (Germ.)

17. Elytra dark brown or brownish black ..... 31. *vidua* (Bn.)
Elytra reddish brown ..... 32. *bombycina* (Germ.)
18. Hind angle of pronotum without distinct carina 19
Hind angle of pronotum with distinct carina 24
19. Pronotum reddish yellow, the broad central line dark brown; elytra reddish or reddish brown, without spots ..... 26. *laricis* (Bn.)
Pronotum entirely black, or the hind angles reddish (*propola* group of Brown) 20
20. Pronotum wholly black 21
Hind angle of pronotum reddish 22
21. Elytron with a single dark spot at basal two-fifths ..... 34. *bipunctata* (Bn.)
Elytra without spots, reddish with a dark suture ..... 33. *ochreipennis* (LeC.)
22. Elytra with a definite pattern of dark markings 23
Elytra reddish yellow without pattern ..... 35. *hoppingi* (V.D.)
23. Elytral pattern as illustrated (Fig. 47), the markings reduced to two spots or a bar anteriorly, and a short, slightly curved bar posteriorly ..... 37. *columbiana* (Bn.)
Elytral pattern as illustrated (Figs. 48, 49), the posterior mark crescentic ..... 36. *propola* (LeC.)
24. Elytron with dark pattern; pronotum convex, the sides obviously curved and convergent in front; antennal segments broader toward apices 25
Elytron without pattern; pronotum flattened and nearly square; antennal segments scarcely broadened toward apices ..... 27. *lutescens* (Fall)
25. Propleura black except posterior margins; hind angle of pronotum black, only very obscurely reddish inside ..... 40. *nigricollis* (Bland)
Propleura reddish yellow; hind angle of pronotum reddish yellow (*propola* group of Brown) 26
26. Southern Manitoba; crescentic mark of elytron much longer next to suture ..... 38. *hieroglyphica* (Say)
Southern Alberta; crescentic mark of elytron transverse, not longer next to suture ..... 39. *pudica* (Bn.)
27. Pronotum and elytra bright metallic green, bronze, coppery, or blue; slender species ..... 13. *resplendens* (Esch.)
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1. *Ctenicera sulcicollis* (Say) Fig. 27

Length 13.0 - 17.0 mm. Reddish brown. Pubescence very fine and scanty, golden. Third antennal segment longer than fourth, somewhat narrower. Pronotum longer than board, flat, with median sulcus for entire length, the pronotum broadest at the anterior margin and tapered to the divergent hind angles; hind angle with a long and strong carina next outer margin; prosternal suture not excavate in front. Pronotal punctures rather small and shallow, separated by about their diameters; interspaces not polished; propleuron dull. Elytra a little widened behind center; striae distinct.

Distribution: Brandon, Man. Specimens: 3.

2. *Ctenicera kendalli* (Kirby)

Length 11.0-18.0 mm. Metallic greenish black; elytra wholly purple, or pale yellow with the suture and a narrow elongate spot on the apical third of each elytron purple. Pubescence sparse, pale yellow on pronotum and body, mostly black on elytra with some yellow at margins. Antennal segments of male pectinate, the ventral extensions much longer than the segments; segments of female triangular, strongly projecting below at the apices. Pronotum longer than wide, with a deep, wide, median sulcus on entire length; hind angle with strong carina. Pronotal punctures large, shallow and coarse, separated by less than their diameters on the disk, contiguous on the sides and below. Elytra long and tapered, not widened behind center; striae distinct.

Distribution: Parklands and predominantly poplar forests throughout the area. Specimens: 64.

3. *Ctenicera pygmaea* (Van Dyke)

Length 7.0-9.0 mm. Black; posterior margin of propleuron somewhat reddish; elytra pale yellow, reddish brown, or black; antenna dark brown; legs pale yellow or brown. Pubescence short, appressed and moderately dense, pale yellow. Antennal segments subrectangular, large, the third similar to the fourth in size, shape, and pubescence. Pronotum feebly convex, longer than wide, the sides subparallel; hind angle short and triangular, without carina. Pronotal punctures moderately large and shallow, separated by about half their diameters on the disk, contiguous on the sides and below. Elytra parallel-sided to the tapering apices; striae distinct.

This species is usually determined as a subspecies of *lobata* (Esch.).

Distribution: Widespread in forests and parklands throughout the area; very abundant in long grass in low moist places around poplar-willow groves and nearly dry ponds. Specimens: 128.

4. *Ctenicera cuprascens* (LeConte)

Length 12.0-16.0 mm. Black or bronze; elytra black, or brownish at the sides; legs brown. Pubescence moderately long, dense and depressed, intermixed brownish and greyish yellow; pubescence of elytra often appearing striped due to alternating rows of short and long hairs. Antenna serrate, the segments very short and broad, the third segment very similar to the fourth but smaller. Pronotum convex with shallow median sulcus on posterior fourth to half, the sides subparallel or somewhat curved; hind angle broad, with an obtuse carina. Pronotal punctures moderately large and deep, separated by more than their diameters on the disk, very close at the sides. Elytra parallel-sided to the tapered apices; striae distinct.

The specimens from this area appear to represent an undescribed subspecies of *cuprascens*. It is frequently determined as *sjaelandica* (Müller).

Distribution: Swamp habitats from near Brandon, Man. to Prince Albert, Sask. Specimens: 7.

5. *Ctenicera* sp. A

This appears to be an undescribed species (W. J. Brown in litt.).

Length 9.0-10.0 mm. Black; anterior margin of pronotum, margins of propleuron, costal margin, suture and epipleuron, and margin of abdomen obscurely reddish; antenna and legs reddish brown. Pubescence moderately dense, short and appressed, pale yellow. Antennal segments short and broad, the third very similar to the fourth in shape but a little shorter; sixth antennal segment a little longer than broad, projecting below, dull. Pronotum convex, as wide as long and with shallow median sulcus on posterior half or more; sides of pronotum slightly curved, convergent in front; hind angle with a very weak carina mostly hidden by hair; prosternal suture not excavate in front. Pronotal punctures moderately large and deep, separated by about their diameters on the disk, somewhat less at the sides and below. Elytral width equal to pronotal width, the elytral margins parallel to the tapered apices; elytral intervals flat, conspicuously punctulate.

Distribution: Parklands from Stonewall in eastern Manitoba to Edmonton, Alberta. It occurs with *Limonius aeger*, *Ctenicera pygmaea*, and *Dalopius* spp. in long grass around the margins of poplar groves. Specimens: 17.

6. *Ctenicera spinosa* (LeConte)

Length 11.0-15.0 mm. Black; narrow lateral and posterior margins of propleuron reddish; pronotum frequently narrowly margined with red; elytra reddish brown; antenna and legs dark brown. Pubescence short and appressed, pale yellow. Third antennal segment similar to the fourth in shape but a little longer. Pronotum flat, a little longer than broad, the sides slightly curved and convergent in front; hind angle with a weak carina. Pronotal punctures small and dense, separated by about their diameters on the disk but larger and shallower at the sides and below. Elytra a little widened behind the center; striae distinct.

Distribution: Sandilands and Whiteshell Forest Reserves, and at Morris in eastern Manitoba. Specimens: 4.

7. *Ctenicera umbricola* (Eschscholtz)

Length 11.0-14.0 mm. Black; lateral and posterior margins of propleuron, and hind angle of pronotum red. Pubescence short and appressed, grey. Third antennal segment very similar to the fourth in shape and length. Pronotum as

wide as long, the sides slightly curved and convergent in front; hind angle with very fine carina next outer margin. Pronotal punctures very small and widely spaced on the disk, large, shallow, and close together at the sides and on propleuron. Elytra not widened behind center; striae distinct.

Distribution: Montane and subalpine forests from Waterton to Banff in western Alberta; on pine and spruce. Specimens: 6.

8. *Ctenicera stricklandi* (Brown) Fig. 32

Length 11.0-16.0 mm. Black; antenna and legs dark brown. Pubescence short, fine and appressed, pale yellow. Third segment very similar to the fourth in shape and length. Pronotum flat, longer than wide, or a little wider than long, the sides decidedly convergent in front; hind angle with a weak carina next outer margin. Pronotal punctures moderately large and deep, separated by less than their diameters on the disk, larger at the sides. Elytra a little widened behind the center; striae distinct. Male genital segments as illustrated.

Distribution: A very common species of the forests and parklands of the entire area; collected on undergrowth in poplar, willow and birch groves. Specimens: 76.

9. *Ctenicera crestonensis* (Brown) Fig. 33

Length 14.0-18.0 mm. Wholly black with dark brown antenna and legs; hind margin of propleuron occasionally reddish. Male genital segments as illustrated.

This species is similar to *stricklandi* and can only be separated from *stricklandi* on characters of the male genital segments.

Distribution: Castle Mount and Beaver Mines in the mountains of western Alberta; on pine and spruce. Specimens: 2.

10. *Ctenicera silvatica* (Van Dyke)

Length 13.0-17.0 mm. Long, slender, wholly black species; pubescence moderately dense, white or pale yellow. Antennal segments rectangular or subcylindrical, the third segment shorter and narrower than the fourth. Pronotum conspicuously longer than broad, feebly convex, the median sulcus complete but very shallow, the side margins nearly straight; hind angle with a strong carina next outer margin; posterior margin of propleuron with conspicuous emargination; prosternal suture not excavate in front. Pronotal punctures large and moderately deep, separated by less than their diameters on the disk, closer at the sides. Elytra narrow; striae distinct.

Distribution: Montane and subalpine forests from Waterton to Banff in southwestern Alberta. Specimens: 12.

11. *Ctenicera limoniiformis* (Horn)

Length 9.0-10.0 mm. Black; epipleuron and legs brown. Pubescence moderately dense, pale. Pronotum longer than broad and convex, with shallow median sulcus on posterior half, the sides subparallel and convergent in front; hind angle with a weak carina mostly hidden by the pubescence; posterior margin of propleuron with a conspicuous emargination; prosternal suture slightly excavate in front. Pronotal punctures large and deep, separated by about half their diameters on the disk and on propleuron, a little closer at the sides; interspaces shiny. Elytra wholly narrow; striae distinct.

Distribution: Parklands from Souris and Carberry, Man., northwestward to Calling Lake, Alta., and in the Cypress Hills of southeastern Alberta; grassy margins of fields and groves. Specimens: 21.

12. *Ctenicera mendax* (LeConte)

Length 9.0-11.0 mm. Black; epipleuron and posterior margin of propleuron brown; legs brownish black. Pubescence rather sparse, pale yellow. Pronotum longer than broad and convex, the median sulcus absent or very faint on posterior fourth, the sides subparallel and convergent in front; hind angle with a weak and obtuse carina that is hidden by pubescence; posterior margin of propleuron shallowly emarginate; prosternal suture slightly excavate in front. Pronotal punctures moderately large and deep, separated by about their diameters on the disk, closer at the sides; interspaces shiny. Elytra wholly narrow; striae distinct.

Distribution: Montane, subalpine and boreal forests eastward to Reserve, Sask., and in the Cypress Hills of southeastern Alberta; on spruce, pine and larch. Specimens: 10.

13. *Ctenicera resplendens* (Eschscholtz)

Length 11.0-14.0 mm. Metallic green, bronze, coppery or blue; antenna and legs black or brown. Pubescence virtually absent, very fine, short and dark. Pronotum longer than broad, with very shallow median sulcus on posterior third, the sides nearly straight; hind angle with a strong carina. Elytra slender, parallel-sided; striae distinct.

Two subspecies of *resplendens* have been collected in the study area; these may be separated as follows:

Dark, bronzy black; pronotal punctures larger, separated by less than half their diameters on the disk; subalpine and montane forests ..... *resplendens* (Esch.)

Bright green to bronze, occasionally blue; pronotal punctures smaller, separated by about their diameters on the disk; widespread in boreal forests and parklands *aeraria* (Rand.)

Distribution: Occurs in wooded areas, and may be collected in nearly every grove in the prairies and parklands as well as in all forests. The adults are usually collected on poplar and willow, or on shrubs. Specimens: 250.

14. *Ctenicera rufopleuralis* (Fall)

Length 10.0-12.0 mm. Black; prosternal lobe, margins of pronotum, propleuron, sides of abdomen and epipleuron red; basal antennal segment red; legs reddish. Pubescence rather dense, white or pale yellow. Pronotum as wide as long and with a shallow median sulcus, the sides curved and convergent in front; hind angle of pronotum with strong carina. Pronotal punctures moderately large and deep, separated by about their diameters on the disk, a little closer at the sides; interspaces shiny. Elytra somewhat widened behind center; striae distinct.

Distribution: Winnipeg, Husavick and Gimli in eastern Manitoba. Specimens: 6.

15. *Ctenicera nitidula* (LeConte)

Length 9.0-10.5 mm. Black; prosternal lobe and epipleuron brown; basal antennal segment reddish; legs reddish yellow or brown. Pubescence moderately long and woolly, yellowish. Pronotum convex with narrow median sulcus, the sides subparallel and convergent in front; hind angle with strong carina; posterior margin of propleuron emarginate. Pronotal punctures very small, pinpricklike

and widely spaced; interspaces polished. Elytra somewhat widened behind center; striae distinct.

Distribution: A common black species collected in the boreal and subalpine forests throughout the area; on a great variety of evergreen and deciduous trees and shrubs. Specimens: 45.

16. *Ctenicera arata* (LeConte)

Length 11.0-13.0 mm. Black; epipleuron and prosternal lobe brown; legs reddish brown. Pubescence rather dense and woolly, white or yellowish. Pronotum as long as broad, somewhat flattened, with a shallow median sulcus on posterior half, the sides curved and strongly convergent in front; hind angle of pronotum with strong carina. Pronotal punctures moderately large and shallow, separated by about their diameters on the disk, larger, shallower, and very closely placed at the sides and on propleuron; interspaces not polished. Elytra somewhat widened behind center; striae distinct.

Distribution: Boreal forests from Victoria Beach, Man. to Whitecourt, Alta.; on spruce. Specimens: 17.

17. *Ctenicera glauca* (Germar)

Length 7.0-9.0 mm. Black. Pubescence dense and white, much denser at the postero-lateral corners of the abdominal segments. Antennal segments small, narrow and symmetrical. Pronotum convex and arched, wider than long with very shallow median sulcus on posterior half, the sides curved; hind angle with a strong carina; posterior margin of propleuron deeply emarginate; prosternal suture excavate in front. Pronotal punctures large and shallow, especially at the sides. Elytra a little broadened behind the center; striae distinct.

Distribution: A common species in the southwestern prairies from Calgary and Waterton, Alta., to Assiniboia, Sask. The adults feed on a variety of prairie plants. Specimens: 62.

18. *Ctenicera sexualis* (Brown)

Length 7.0-9.0 mm. Brownish black; head black. Pubescence virtually absent, the small amount on the margin of pronotum and scutellum white. Antennal segments beyond the fourth roughly rectangular. Pronotum as wide as long, the sides curved; hind angle with rather weak carina near outer margin. Pronotal punctures small and moderately deep, separated by more than their diameters on the disk, closer at the sides; interspaces polished. Elytra not widened behind; striae 10 at apical third, the intervals finely punctulate. Apical abdominal segment of male with a curved ridge that is furnished with a dense brush of hairs on each side; female apical segment slightly modified.

This species and *morula* (LeC.) differ from other American species in possessing the distinctive abdominal structures described above.

Distribution: Dry mixed prairie from Saskatoon and Val Marie in western Saskatchewan to Wainwright and Medicine Hat in eastern Alberta. Specimens: 22.

19. *Ctenicera morula* (LeConte)

Length 11.0-16.0 mm. Black or rarely bicolored. Pubescence virtually absent, the small amount on the margins of the thorax and scutellum pale yellow. Antennal segments beyond third long, rectangular and slender. Pronotum as wide as long, the sides curved and obviously convergent in front; hind angle

with a strong carina. Pronotal punctures moderate and shallow, separated by less than their diameters on the disk, closer at the sides; interspaces shiny. Elytra not broadened apically; striae 10 at apical third, the intervals convex and finely punctulate. Apical abdominal segment of male with a curved ridge furnished with a dense brush of hairs on each side; female segment feebly tumid at sides just before apex and swellings supplied with a few longer, more closely placed hairs.

This species and *sexualis* (Bn.) differ from other American species in possessing the distinctive abdominal structures described above.

Distribution: Subalpine and boreal forests eastward to Whitefox and Nipawin, Sask. The habits of this species appear much the same as those of *aeripennis*. Specimens: 42.

20. *Ctenicera destructor* (Brown)

Length 8.0-13.0 mm. Differs from *aeripennis* only in the smaller size and the color of the elytra. Elytra black, often with a faint bluish or greenish shade; elytral intervals generally less wrinkled than in *aeripennis*, the small punctures more obvious; legs and antenna often pale brown.

C. destructor was originally described as a subspecies of *aeripennis*. Apparent intermediates between the two are occasionally collected in the northern parklands and in the Peace River area. There is no evidence however that the two forms hybridize, and *aeripennis* larvae do not normally survive when reared in prairie soil. On the basis of this apparent reproductive isolation, and slight morphological and habitat differences, *destructor* is best considered a separate species from *aeripennis*.

Distribution: Appears to be confined to the black and brown soils throughout the area. It has been collected on a number of black soil "islands" in the Peace River and Wood Buffalo Park within the boreal forest region of northern Alberta. Specimens: 1,560.

21. *Ctenicera aeripennis* (Kirby) Fig. 37

Length 11.0-16.0 mm. Black; elytra dark metallic green, bluish bronze, or coppery. Pubescence virtually absent. Antennal segments shiny, with sparse pubescence. Pronotum a little broader than long, the sides curved; hind angle truncate at apex when viewed from below; hind angle with strong carina. Pronotal punctures moderately large and shallow, separated by less than their diameters on the disk, very close at the sides and more widely spaced on propleuron; interspaces polished. Elytra widened behind center; striae distinct.

Distribution: Montane, subalpine, and northern boreal forests of Alberta and Saskatchewan, and the Mafeking-Herb Lake district of western Manitoba. East of this area it is apparently replaced by the closely related *appropinquans*. In the Peace River district and similar areas of northern Alberta, *aeripennis* is collected in the grey soil zone of the Forest Formation, while *destructor* is collected in the black soil zones of the grassland "islands". Specimens: 560.

22. *Ctenicera semimetallica* (Walker) Fig. 35

Length 15.0-20.0 mm. Black; elytra strongly metallic, dark bluish or green. Pubescence virtually absent. Antennal segments shiny with sparse pubescence. Pronotum as broad as long, the sides curved; hind angle, viewed from below, oblique to an acute point; hind angle with a strong carina. Pronotal punctures large and shallow, especially at the sides where they run into one another, separated by less than their diameters on the disk; propleuron entirely rough and dull. Elytra widened behind center; striae distinct.

Distribution: From Waterton and Pincher to Banff in western Alberta. The habits appear similar to those of *aeripennis* and the species is usually collected on a variety of shrubs and trees. Specimens: 25.

23. *Ctenicera appropinquans* (Randall) Fig. 36

Length 12.0-15.0 mm. Black; elytra dark metallic black, greenish, or bronze. Pubescence virtually absent. Antennal segments shiny with sparse pubescence. Pronotum broader than long, the sides curved; hind angle of pronotum, when viewed from below, rounded with the apex produced as a point dorsally; hind angle with strong carina. Pronotal punctures moderately large and shallow, separated by about their diameters on the disk, larger and shallower at the sides and on propleuron. Elytra widened behind center; striae distinct.

Distribution: Forests of Manitoba, and northwestward in the forests of Saskatchewan to Armit, Montreal Lake, Lac la Ronge, and Lake Athabasca. Specimens: 36.

24. *Ctenicera splendens* (Zeigler)

Length 10.0-12.0 mm. Dark metallic green; hind angle of pronotum, margins of propleuron, prosternal lobe, and epipleuron reddish yellow; antenna yellow or brown; legs reddish yellow. Pubescence virtually absent. Antennal segments shiny with sparse pubescence. Pronotum wider than long, the sides curved; hind angle with a strong carina. Pronotal punctures moderately coarse and rather deep on the disk; larger, shallower and closer at the sides; interspaces shiny. Elytra widened behind the center; striae distinct.

Distribution: Boreal forests from Whiteshell, Man. to Saunders, Alta. It is more common in jackpine associations than in spruce. Specimens: 16.

25. *Ctenicera cruciata* (Linnaeus) Figs. 51-55

Brown (1935) recognized three subspecies of *cruciata*: *pulcher* from eastern Canada and United States, *cruciata* from Europe, and *festiva* from western Canada. The subspecies *cruciata* and *festiva* are very much alike; *pulcher* is somewhat less similar.

Length 10.0-14.0 mm. Reddish yellow; pronotum and head with a broad, black, central stripe; lateral margins of pronotum, margins of propleuron, and prosternum black (rarely pale); elytra usually reddish yellow or yellow, with a black pattern, sometimes wholly black with pale epipleura. Pubescence virtually absent except on hind margin of pronotum and scutellum. Pronotum slightly wider than long, the sides curved; hind angle with a strong carina; prosternal suture not excavate in front. Pronotal punctures moderately large and deep, separated by about their diameters on the disk, closer, larger and shallower at the sides. Elytra broadened behind center; striae distinct.

The only character separating *festiva* from typical *cruciata* appears to be the slightly more widely spaced pronotal punctures. The character is feeble and variable.

Distribution: Widely distributed in the forests and parklands, and in local parklands within the mixed prairie. The very dark variant is rare, and has been collected only in the mountains. Specimens: 124.

26. *Ctenicera laricis* (Brown)

Length 7.8-9.2 mm. Dark reddish brown or reddish yellow; head, broad central line of pronotum, hind pronotal angles, and scutellum dark brown; elytra reddish brown, usually darker brown on the disk and behind; ventral surface

reddish brown; antenna and legs reddish brown. Pubescence very fine and short, golden. Third and fourth antennal segments very similar, the fourth a little longer and somewhat broader at the apex; segments five to nine feebly serrate, shorter than the third. Pronotum a little wider than long, feebly convex, the sides moderately and evenly curved; hind angle short and broad, without carina. Pronotal punctures fine, separated by about their diameters on the disk; surface shiny. Elytra feebly convex, widest at apical third; striae distinct.

Distribution: Waterton, Alta. (F. S. Carr, 1922). The species was originally described from Creston, B.C., on larch. Specimens: 2.

27. *Ctenicera lutescens* (Fall)

Length 9.0-11.0 mm. Entirely rich brown, or black with brown elytra; antenna red or black; legs brown or yellow. Pubescence moderately long, dense on the pronotum. Antennal segments more cylindrical than in other species, long and narrow; third antennal segment four-fifths as long as the fourth, similar to but longer than the second. Pronotum feebly convex, as wide as long, the sides nearly parallel to the sharply divergent hind angles; hind angle long and slender, with strong carina. Pronotal punctures small, separated by more than their diameters on the disk, closely placed at the sides and below. Elytra long and parallel-sided to the short tapered apices; striae very shallow or indistinct in front, the intervals flat and conspicuously punctulate. Tarsal segments with small felty pads below at the apices.

Distribution: Subalpine and boreal forests eastward to Prince Albert and Waskesiu, Sask., on spruce and fir. Specimens: 9.

28. *Ctenicera triundulata* (Randall) Figs. 44, 45

Length 6.0-9.0 mm. Black; posterior margin of propleuron reddish; elytra reddish yellow with three crescentic or transverse dark markings, the anterior mark usually elongate next the suture; legs brown. Pronotal pubescence fine and sparse, yellow; elytral hair longer and denser. Second and third antennal segments small and narrow, together as long as the fourth. Pronotum a little wider than long, the sides curved and somewhat convergent in front; hind angle short and without carina, or this very fine; hind margin of propleuron not emarginate. Pronotal punctures very small and widely spaced; interspaces shiny. Elytra somewhat broadened behind center; striae distinct.

Distribution: A common and widely distributed species in montane, subalpine and boreal forests; on pine and spruce. Specimens: 68.

29. *Ctenicera nebraskensis* (Bland) Fig. 46

Length 9.0-11.0 mm. Black; hind margin of propleuron reddish; elytra pale reddish yellow to brown, with three crescentic darker markings, the markings not elongate on the inside; antenna and legs brown. Pronotal pubescence sparse but long, pale yellow; elytral pubescence moderately long, yellow (black on the darker markings). Second antennal segment about half as long as the third, the two together longer than the fourth. Pronotum wider than long, the sides curved and convergent in front; hind angle with very fine carina or none; posterior margin of propleuron not emarginate. Pronotal punctures very small, moderately dense; interspaces shiny. Elytra somewhat broadened behind center; striae distinct.

This species is similar to *triundulata* but larger, with shorter third antennal segment, and a slight difference in the shape of the elytral markings.

Distribution: Waterton and Frank, Alta.; on fir. Specimens: 5.

30. *Ctenicera mediana* (Germar) Fig. 43

Length 8.5-11.0 mm. Black; hind margin of propleuron reddish; elytra wholly reddish; antenna dark brown or black, the basal segment reddish; legs brown or reddish. Pubescence dense and short, yellow, arranged in a slight pattern on the elytra. Pronotum a little wider than long, convex, without median sulcus, the sides curved and strongly converging in front; hind angle with a strong carina; posterior margin of propleuron not emarginate; prosternal suture excavate in front. Pronotal punctures small and shallow, separated by about their diameters; interspaces shiny. Elytra somewhat broadened behind center; striae distinct.

Distribution: Forests from southeastern Manitoba to Athabasca and Saunders, Alta., and in the Cypress Hills of southeastern Alberta; on pine and spruce. Specimens: 32.

31. *Ctenicera vidua* (Brown)

Length 9.5-12.5 mm. Black; elytra dark brown or blackish brown, the epipleura paler; antenna and legs dark brown or black. Pubescence dense, short and yellow, distinctly arranged in whorls on the elytra. Pronotum broader than long, without median sulcus, the sides curved and strongly convergent in front; hind angle with a strong carina; posterior margin of propleuron not emarginate; prosternal suture excavate in front. Pronotal punctures small and deep, very closely placed. Elytra somewhat broadened behind center; striae distinct.

This species is similar to *bombycina* (Germ.) but darker, with stouter third antennal segment, and more rounded basal parts of the male parameres.

Distribution: Banff, Alta. Specimens: 2.

32. *Ctenicera bombycina* (Germar) Fig. 42

Length 10.0-15.0 mm. Black; elytra entirely reddish. Pubescence dense, short and yellow, distinctly whorled on the elytra. Pronotum about as long as wide, the sides curved and strongly convergent in front; hind angle with strong carina; posterior margin of propleuron not emarginate; anterior part of prosternal suture excavate. Pronotal punctures small and moderately deep, separated by less than their diameters. Elytra somewhat broadened behind center; striae distinct.

Distribution: Montane and subalpine forests of Alberta; on spruce, fir and pine. Specimens: 23.

33. *Ctenicera ochreipennis* (LeConte) Fig. 50

Length 6.0-7.0 mm. Black; elytra pale reddish with a narrow black stripe on the suture; antenna and legs dark brown or black. Pubescence fine, yellow. Pronotum broader than long and without median sulcus, the sides curved and convergent in front; hind angle without carina; posterior margin of propleuron with shallow emargination. Pronotal punctures very small; interspaces shiny. Elytra only a little widened behind center; striae distinct.

Distribution: Boreal and subalpine forests from Whiteshell, Man., to Banff and Jasper, Alta.; on pine, fir and spruce. Specimens: 24.

34. *Ctenicera bipunctata* (Brown) Fig. 38

Length 9.0-10.5 mm. Black; elytra reddish yellow with one black spot on each elytron. Pubescence fine and yellow, brown on the dark elytral marks. Pronotum broader than long, the sides curved and obviously convergent in front,

the hind angles short; hind angle without carina; posterior margin of propleuron with shallow emargination. Pronotal punctures very small; interspaces shiny. Elytra somewhat widened behind center; striae distinct.

Distribution: Waterton, Alta.. Specimens: 2.

35. *Ctenicera hoppingi* (Van Dyke) Fig. 29

Length 8.0-10.5 mm. Black; propleuron and hind angle of pronotum obscurely reddish; elytra wholly red; antenna and legs brown. Pubescence fine and short, yellow. Antennal segments subcylindrical, the third narrow, 1½ times as long as the second, shorter than the fourth. Pronotum as wide as long, the sides curved and convergent in front; hind angle without a carina. Pronotal punctures very fine, the surface shiny. Elytra slightly widened behind center. Tarsi abnormally long in the male, those of the front and middle legs longer than the tibiae. Male genital segments as illustrated.

This species is very similar to occasional specimens of *propola* that lack elytral pattern.

Distribution: Subalpine and boreal forests as far eastward as the Riding Mountains in western Manitoba, and in the Cypress Hills of southeastern Alberta; on spruce. Specimens: 16.

36. *Ctenicera propola* (LeConte) Figs. 31, 48, 49

Length 7.0-9.0 mm. Black; hind angle of pronotum and posterior margin of propleuron red; elytra red or reddish yellow, usually with a black pattern; antenna and legs reddish or brown. Pubescence moderately dense, yellow (brown on the dark elytral markings). Antennal segments small and symmetrical, the third narrow and longer than the second, shorter than the fourth. Pronotum as broad as long, the sides curved and obviously convergent in front; hind angle without a carina or this linelike. Pronotal punctures very fine, the surface shiny. Elytra somewhat broadened behind center; striae distinct. Male genital segments as illustrated.

Three distinct color variants may be separated as follows:

1. Elytra entirely reddish, without black pattern ..... *variant a*
   Elytra with a distinct pattern 2
2. Anterior margin of elytra surrounding scutellum reddish yellow; anterior dark mark of elytron entire and usually extended along the inner margin to join the posterior mark; more yellowish (Fig. 48) ..... *variant b*
   Anterior margin of elytra surrounding scutellum dark; anterior dark mark of elytron divided into humeral and sutural spots and not usually extended to join the posterior mark; more reddish (Fig. 49) ..... *variant c*

Variant *a* is very similar to *hoppingi* in appearance; it is rare. Variants *b* and *c* occur together in about equal numbers throughout the distribution of the species.

Distribution: Very common throughout the forested area, and widespread but infrequent in the parklands. It is usually collected on pine, spruce, fir and larch, but occasionally on oak, ash and birch. The adults appear to eat pollen. Specimens: 175.

37. *Ctenicera columbiana* (Brown) Figs. 30, 47

Length 7.0-8.0 mm. Black; hind angle of pronotum and posterior margin of propleuron red; elytra red with distinctive black pattern; antenna and legs red or brown. Pubescence thin, pale yellow (brown on the dark elytral markings).

Pronotum broader than long, the sides curved and convergent in front; hind angle without carina or the carina very fine; posterior margin of propleuron with shallow emargination. Pronotal punctures very fine; interspaces shiny. Elytra somewhat widened behind center; striae distinct.

This species was originally described as a subspecies of *propola* (LeC.). It is generally smaller than *propola* with the third antennal segment a little longer, and the posterior elytral spot more transverse. In the specimens examined there appeared to be no intergration with typical *propola*, and in this paper *columbiana* is regarded as a distinct species in the *propola* group.

Distribution: Waterton, Alta. Specimens: 6.

38. *Ctenicera hieroglyphica* (Say) Fig. 40

Length 11.0-13.0 mm. Black; hind angle of pronotum, posterior margin or entire propleuron, prosternal lobe, and sometimes most of scutellum reddish; elytra pale reddish yellow with a conspicuous pattern; antenna and legs reddish. Pubescence of pronotum moderately dense, golden; pubescence of elytra short and sparse, wholly yellow. Pronotum as wide as long, without median sulcus, the sides curved and obviously convergent in front; hind angle with a feeble, short carina that does not extend forward on to the body of the pronotum. Pronotal punctures very fine, the surface shiny. Elytra somewhat widened behind the center; striae distinct.

Distribution: Parklands of southern Manitoba; on undergrowth. Specimens: 16.

39. *Ctenicera pudica* (Brown) Fig. 39

Length 9.5-12.5 mm. Black; propleuron, hind angle of pronotum, middle of scutellum and often a large part of the abdomen reddish; antenna and legs red; elytra light reddish yellow with dark pattern, the markings often greatly reduced until only short bars are evident. Pubescence short and dense, pale yellow (brown on dark elytral spots). Pronotum broader than long, the sides curved and obviously converging in front; hind angle with strong carina. Pronotal punctures very small and fine, closely placed. Elytra somewhat widened behind center; striae distinct.

Distribution: From Banff and Waterton to Medicine Hat and Cypress Hills in southern Alberta; on birch, poplar or willow in groves of deciduous trees. Specimens: 22.

40. *Ctenicera nigricollis* (Bland) Fig. 41

Length 10.0-15.0 mm. Black; posterior margin of propleuron reddish; elytron reddish with two crescentic or transverse black marks; antenna and legs brown. Pubescence moderately dense, yellow (brown on dark elytral spots). Antennal segments large and subcylindrical. Pronotum about as wide as long, the sides curved and conspicuously convergent in front; hind angle with a carina next outer margin; posterior margin of propleuron with a shallow emargination; prosternal suture not excavate in front. Pronotal punctures fine and deep, narrowly separated. Elytra somewhat broadened behind center; striae distinct.

Distribution: Montane, subalpine and boreal forest of Alberta, and at Victoria Beach and Whiteshell in eastern Manitoba; on pine and spruce. Specimens: 15.

Genus *Hypolithus* Eschscholtz

Anterior part of front nearly flat or somewhat depressed at the center, the margin nearly complete but without raised rim at center. Prosternal lobe long; prosternal suture slightly curved outwardly; posterior margin of propleuron irregular but not produced; hind coxal plate very broad inside, the slope abrupt and the free angle about 90 degrees. Elytral striae distinct. Tarsal segments and claws simple.

Horn (1891) revised the genus under the name *Cryptohypnus*, and Lane (1948: 221) corrected the generic synonymy.

Key to Species

1. Pronotal punctures coarse, in the form of pits and ridges; pronotum more flattened, dull or striate 2
   Pronotal punctures small and round; pronotum usually more convex, shiny or polished .. 3
2. Pronotum flat; pronotal punctures not distinct but forming a fine network of irregular ridges over the entire surface; ventral surface of abdomen covered with fine hair only ..... 1. *funebris* (Cand.)
   Pronotum more convex; pronotal punctures distinct, the interspaces striate; ventral surface of abdomen covered with fine prostrate hair intermixed with stouter, semi-erect hairs ..... 2. *squalidus* (LeC.)
3. Scutellum shiny, sparsely covered with fine hair 4
   Scutellum densely covered with conspicuous yellow hair 5
4. Hind angle of pronotum short and stout, three-fifths as broad at base as long; length 5.0-6.0 mm. ..... 4. *bicolor* Esch.
   Hind angle of pronotum long and narrow, about half as broad as long, strongly divergent; length 7.5-9.0 mm. ..... 3. *glacialis* (V.D.)
5. Pronotum broad, narrowed on the anterior two-thirds, the sides often obtusely subangular in front of the bend ..... 5. *abbreviatus* (Say)
   Pronotum narrower, narrowed on anterior fourth, the sides nearly straight and parallel ..... 6. *impressicollis* (Mann.)

1. *Hypolithus funebris* (Candeze)

Length 7.0-8.0 mm. Black; basal antennal segment and legs reddish brown. Pubescence short and sparse, brown; scutellum sparsely haired. Pronotum broadest toward front, flat, the anterior corners projecting far forward; hind angle small and short. Pronotal punctures not distinct but the entire pronotum covered by a network of irregular ridges and pits that give an opaque appearance.

Distribution: Calgary, Frank, Pincher, and Lethbridge in southwestern Alberta. Specimens: 11.

2. *Hypolithus squalidus* (LeConte)

Length 7.0-8.0 mm. Black or dark brown, the underside usually paler; elytra black, with costal margins and epipleura paler; basal antennal segments and legs reddish yellow. Pubescence of dorsal surface short and sparse, of yellow and brown hairs intermixed; scutellum shiny, sparsely haired. Pronotum flat on the disk and without median sulcus, broadest anteriorly, and anterior corners extending forward; hind angle short and stout. Pronotal punctures deep, elongate and pitlike; interspaces densely striate, but the striae not concealing the punctures.

Distribution: Waterton, Alta. Specimens: 4.

3. *Hypolithus glacialis* (Van Dyke)

Length 7.5-9.0 mm. Dark brown or black; antenna and legs reddish yellow. Pubescence of dorsal surface fine and sparse, brown; scutellum shiny, sparsely haired. Pronotum flat on disk but convex toward sides; hind angle long and

divergent. Pronotal punctures very small and shallow, widely separated; interspaces polished.

Distribution: Waterton, Alta. Specimens: 6.

4. *Hypolithus bicolor* Eschscholtz

Length 4.5-6.0 mm. Black; ventral surface of prothorax and hind angle of pronotum reddish; elytra brown, more reddish at sides and in front; legs reddish yellow. Pronotal pubescence fine and short, brownish; elytral pubescence mostly short and fine, brown, with intermixed yellow hairs more abundant at the sides; scutellum shiny black with sparse pubescence. Pronotum convex with shallow median sulcus on posterior half, the sides evenly curved and the hind angle short. Pronotal punctures small and deep, separated by little more than their diameters; interspaces polished.

This species apparently reproduces parthenogenetically in the north and west as no males have been collected in the grey-soil forest areas. Males are commonly collected south and east of the grey soil zone (Zacharuk, 1958).

Distribution: Widely distributed and common in the southern half of the three Provinces and also collected at Gillam and Churchill, Man. It is one of the most destructive garden and field crop species. Specimens: 850.

5. *Hypolithus abbreviatus* (Say) Fig. 57

Length 5.5-7.0 mm. Black or with propleuron and hind angle of pronotum brown; elytra brownish black or reddish, the darker forms paler toward apex and on costal margin; antenna and legs dark brown or yellowish. Pubescence of pronotum fine and black, or coarse and golden brown; elytral pubescence mostly very short, sparse and brown with some longer, heavier and golden hairs scattered throughout, and an oval patch of golden hairs near the apex; scutellum densely haired. Pronotum variable; sides usually subangularly convergent on the anterior two-thirds. Pronotal punctures small and deep, separated by about their diameters; interspaces polished. Male genital segments as illustrated.

H. abbreviatus is a very variable species both in the shape of the pronotum, and in the form and color of the pronotal pubescence. Some specimens are so like *impressicollis* that they can be identified only by male genital characters.

Two more or less distinct forms or variants have been collected in this region. These do not appear to represent subspecies as they frequently occur together, and all grades of variation between the two have been observed. The two forms may be separated as follows:

Pronotal hair very fine, dark brown or black; antenna, elytra, and ventral surface blackish brown; sides of pronotum more obviously and more angularly convergent in front; generally larger; parklands and forest margins from southeastern Manitoba to Big River, Sask. ..... major form

Pronotal hair coarse and conspicuous, each hair more flattened, brown or yellow; propleuron, prosternal lobe, and elytra reddish; sides of pronotum less obviously and more roundly convergent in front; generally smaller; sandy parkland areas from southeastern Manitoba to Saskatoon, Sask. and Medicine Hat, Alta. ..... minor form

The minor form is intermediate in shape, size and in the characters of pubescence between typical *abbreviatus* and *impressicollis*. Specimens: 240.

6. *Hypolithus impressicollis* (Mannerheim) Fig. 56

Length 4.5-6.0 mm. Black; prosternal lobe and posterior margin of propleuron reddish; elytra reddish brown or dark brown, paler apically and on costal margin; basal antennal segments and legs reddish. Pubescence of pronotum

conspicuous with the hairs somewhat broadened and flattened, of yellow and brown hairs intermixed in swirls; elytral pubescence mostly short and fine but with numerous intermixed stronger yellow hairs; apical fourth of each elytron with an oval patch of wholly yellow hairs; scutellum heavily haired. Pronotum convex with shallow median depression; sides of pronotum nearly parallel or slightly curved, convergent only in front. Pronotal punctures small and deep, separated by about their diameters; interspaces shiny. Male genital segments as illustrated.

This species is similar to *abbreviatus* but narrower, with narrower and more nearly parallel-sided pronotum. The pubescence on both dorsal and ventral surfaces is generally heavier than in *abbreviatus*.

Distribution: Cypress Hills, Lethbridge, Lundbreck and McMurray, Alta., and Gillam and Churchill, Man. Specimens: 11.

Genus *Eanus* LeConte

Anterior part of front flat or depressed, the margin not rimlike. Thorax very short and broad; prosternal spine short and abruptly curved upward; prosternal sutures not excavate in front; hind angle of pronotum without a carina; posterior margin of propleuron not emarginate. Elytral striae obsolete except in front. Tarsi and claws simple.

The species were formerly placed in the subgenus *Paranomus* Kies. (preoc.) of the genus *Ctenicera* (as *Ludius*) (Leng, 1920: 170).

A key to the species may be found in Van Dyke (1932: 390) and in Brown (1930: 161; 1936: 246).

Key to Species

1. Antenna entirely black; length 7.0-9.0 mm. ..... 1. *decoratus* (Mann.)
   Antenna pale at the base; length 5.0-7.0 mm. 2
2. Pronotal punctures very small, pinpricklike, widely spaced; elytron without pale spots other than basal ..... 2. *estriatus* (LeC.)
   Pronotal punctures larger, separated by little more than their diameters; elytron with one or two pale spots in addition to basal spot ..... 3. *albertanus* Bn.

1. *Eanus decoratus* (Mannerheim)

Length 7.0-9.0 mm. Black; elytra black; costal margin, an oval spot at apex of each elytron, and a small round basal spot reddish or yellow; tibiae and tarsi reddish. Pubescence short but woolly, yellow. Second and third antennal segments narrow and shiny, subequal; third antennal segment about three-fourths as long as the fourth. Pronotal punctures moderately large and deep, separated by about their diameters on the disk; interspaces sub-shiny.

Distribution: Widespread in the forests of the three Provinces; on larch or spruce. Specimens: 27.

2. *Eanus estriatus* (LeConte)

Length 6.0-7.0 mm. Black; first and second antennal segments red; elytra black with at most the costal margins, sides of humeri, and a basal spot on each elytron reddish yellow. Pubescence moderate, yellow or golden. Antennal segments small, the third narrow and longer than the second. Pronotal punctures very small and shallow, widely separated; interspaces polished.

Distribution: Montane, subalpine and boreal forests from Waterton and Saunders, Alta. to the Duck Mountain Forest Reserve in western Manitoba; on black spruce. Specimens: 5.

3. *Eanus albertanus* Brown

Length 5.0-7.0 mm. Black; legs and antenna reddish brown; elytra black; costal margin, a round basal spot, a small rounded preapical spot and occasionally a small spot at basal third of elytron yellowish. Pubescence long, mostly white on pronotum, shorter and more golden on elytra. Antennal segments small, the third longer than the second, subequal to and approximately the same shape as the fourth. Pronotal punctures moderate and deep, separated by about their diameters; interspaces shiny.

Distribution: Banff and Blairmore, Alta. Specimens: 3.

Genus *Limonius* Eschscholtz

Anterior part of front flat, the margin raised above the clypeus and usually rimlike. Prosternal suture usually more or less excavate in front; front coxal cavity almost closed behind; hind angle of pronotum very short; posterior margin of propleuron usually not emarginate near outer angle. Elytral striae distinct. Tarsal segments and claws simple.

Van Dyke (1932) recognized two subgenera in *Limonius*: *Pheletes* in which the prosternal suture is not distinctively excavate in front and *Limonius* in which the suture is distinctly excavate. Glen (1950) also divided the genus into two main groups on larval characters, the *Pheletes* of Van Dyke containing species of the *canus* group. The character is very variable and each species shows at least a slight excavation of one form or another (in *L. anceps* the anterior part of the suture is opaque but without an actual excavation).

Van Dyke (1932: 332) published a key and catalogue of the species.

Key to Species

1. Humeri of elytra bright orange in contrast to remainder of body ... 1. *rufihumeralis* Lane
   Elytra not bicolored ... 2
2. Head and pronotum metallic purplish or greenish black; elytra deep black ... 7. *aurifer* LeC.
   Head and pronotum not metallic ... 3
3. Posterior margin of propleuron definitely emarginate; fourth to eleventh antennal segments orange ... 2. *ursinus* V.D.
   Posterior margin of propleuron not emarginate; antennal segments black or brown ... 4
4. Prosternal suture at most slightly excavate in front; elytra brown or reddish; length 9.0-11.0 mm. (*canus* group) ... 5
   Prosternal suture distinctly excavate in front, the excavation limited by a ridge laterally; less than 8.0 mm. long ... 7
5. Pronotal punctures small and round, separated by more than half their diameters; prosternal suture not excavate in front; anterior margin of frons depressed at center ... 3. *anceps* LeC.
   Pronotal punctures large and deep, separated by less than half their diameters; prosternal suture slightly excavate in front; anterior margin of frons rimlike, nearly straight ... 6
6. Anterior margin of frons with a break or irregularity at center, the rim not strictly entire; elytral intervals roughly punctate with larger, more irregular punctures; elytra distinctly ridged posteriorly ... 4. *canus* LeC.
   Anterior margin of frons complete; elytral intervals flat and finely punctate; elytra not ridged ... 5. *californicus* (Mann.)
7. Metasternum transversely ridged; anterior margin of frons distinctly depressed at center ... 6. *pectoralis* LeC.
   Metasternum finely punctate; anterior margin of frons not depressed ... 8
8. Legs, epipleura, and basal antennal segments reddish ... 8. *aeger* LeC.
   Legs, elytra, and antenna black ... 9
9. Head and pronotum with numerous and conspicuous erect hairs in addition to regular depressed pubescence; hind angle of pronotum with weak carina ... 9. *lanei* V.D.
   Head and pronotum without erect hairs; hind angle of pronotum with strong conspicuous carina ... 10

10. Anterior margin of frons shallowly emarginate at center; antenna somewhat serrate; length about 7 mm. ..... 10. *sp. A*
Anterior margin of frons straight or arcuate; antenna not serrate; length 5.0-6.0 mm. ..... 11. *nitidulus* Horn

1. *Limonius rufihumeralis* Lane

Length 9.0-11.0 mm. Black; elytra black with bright red anterior margin and humeri; antenna and legs dark brown. Pubescence sparse, mostly brown with some yellow on paler areas and on posterior margin of pronotum. Antennal segments large, the second and third small and shiny and together about as long as the fourth. Anterior margin of frons complete, rimlike; prosternal suture definitely excavate in front. Pronotal punctures large, round and shallow, separated by less than their diameters; interspaces shiny; hind angle with strong carina not reaching apex; posterior margin of propleuron emarginate next outer angle.

Distribution: Submontane parklands at Calgary, Millarville and Pincher in southwestern Alberta. Specimens: 6.

2. *Limonius ursinus* Van Dyke

Length 8.5-10.0 mm. Black; elytra dark brownish black, epipleura red; antennal segments four to eleven, tibiae, and tarsi reddish yellow. Pubescence dense and long, pale yellow or white. Antennal segments large and rectangular. Anterior margin of frons with a broad V-shaped notch or depression at center; prosternal suture definitely excavate in front; posterior margin of propleuron emarginate next outer angle. Pronotal punctures large, round and shallow, separated by about half their diameters; interspaces shiny; hind angle with a strong carina.

Distribution: Lethbridge, Magrath and Medicine Hat, Alta., and Wood Mountain, Sask. Specimens: 10.

3. *Limonius anceps* LeConte

Length 7.5-9.0 mm. Black; elytra brown, the epipleura more reddish; antenna and legs brown. Pubescence moderately long, dense and woolly, white. Antennal segments small, the third longer than second and shorter than fourth. Anterior margin of frons with notch or depression at center, the rim not complete; prosternal suture not excavate in front. Pronotal punctures moderate, round and deep, separated by about their diameters; interspaces shiny; hind angle with very weak carina.

Distribution: Throughout southern Manitoba and at Hudson Bay Junction in eastern Saskatchewan; sometimes common in grassy spots next groves. Specimens: 15.

4. *Limonius canus* LeConte

Length 9.5-11.0 mm. Dichromatic; male black with the elytra, posterior margin of propleuron, and tibiae reddish brown; female reddish with dark central spot on pronotum and head. Pubescence long, dense and woolly, mostly white or pale yellow. Antennal segments moderately large, the third longer than the second and shorter than the fourth. Anterior margin of frons rim-like but the rim with a break or irregularity at the center; prosternal suture slightly excavate in front. Pronotal punctures large and deep, round or oval, separated by about half their diameters; hind angle with a strong carina bending inwardly toward

apex. Elytral intervals convex, with large irregular punctures so as to appear very rough; elytra distinctly ridged posteriorly.

Distribution: Lethbridge area of southwestern Alberta. Specimens: 5.

5. *Limonius californicus* (Mannerheim)

Length 8.5-11.0 mm. Black; anterior corner of propleuron and margin of abdomen reddish; elytra wholly reddish brown; antenna and femora dark brown, tibiae reddish. Pubescence dense, long and woolly, yellow or white. Antennal segments moderately large, the second and third small and shiny, the fourth broader. Anterior margin of frons rimlike and complete, nearly straight; prosternal suture slightly excavate in front. Pronotal punctures large and deep, round or oval, separated by about half their diameters; hind angle very short, with strong carina bending inwardly toward apex. Elytral intervals nearly flat, with distinct punctures.

Distribution: In saline places in the mixed prairie area and adjacent parklands from Lethbridge, Alta., to Unity and Watson, Sask. and Souris, Man. Specimens: 74.

6. *Limonius pectoralis* LeConte

Length 6.0-8.0 mm. Black; anterior margin and hind angle of pronotum, inner and posterior margins of propleuron, and prosternal lobe reddish; elytra wholly red or dark brownish black; basal antennal segments, tibiae, and tarsi red. Pubescence short and scanty, without longer upright hairs, pale yellow. Antennal segments small and narrow, the third longer than the second. Anterior margin of frons depressed at center, not rimlike; prosternal suture definitely excavate in front. Pronotal punctures very small and widely separated on disk; interspaces polished; hind angle with strong carina.

This species is readily separated from other *Limonius* by the transversely ridged metasternum.

Distribution: Parklands and poplar forests throughout the area. Specimens: 56.

7. *Limonius aurifer* LeConte

Length 5.5-7.0 mm. Head and thorax dark metallic purplish black or greenish blue; prosternal lobe and posterior margin of propleuron reddish; elytra black; antenna and legs black. Pubescence fine and brown, subappressed, with a few long upright hairs. Antenna serrate; second and third segments small and round, together shorter than the fourth. Anterior margin of frons rimlike, emarginate or notched at center; prosternal suture definitely excavate in front. Pronotal punctures small and deep, separated by more than their diameters; interspaces polished; hind angle with a fine carina next outer margin.

Distribution: Victoria Beach, Man. Specimens: 3.

8. *Limonius aeger* LeConte

Length 5.0-6.5 mm. Black; prosternal lobe, anterior corner and posterior margin of propleuron and margin of abdomen reddish; elytra shiny black, the epipleura red; basal antennal segments and legs reddish yellow. Pubescence short, fine and sparse, yellow. Antennal segments small, the second and third about equal. Anterior margin of frons rimlike, nearly transverse; prosternal suture definitely excavate in front. Pronotal punctures moderate, round and deep, separated by about their diameters; interspaces polished; hind angle with short fine carina near outer margin.

Distribution: Parkland and forest habitats throughout the entire area; most abundant in mixed shrubs and poplar groves, and in the long grass around these. Specimens: 128.

9. *Limonius lanei* Van Dyke

Length 6.0-7.5 mm. Black; tibiae and tarsi brown. Pubescence short and white, mostly depressed but with numerous upright hairs on head and pronotum. Antenna serrate, the second and third segments equal and together as long as the fourth. Anterior margin of frons complete, transverse and rimlike; prosternal suture definitely excavate in front. Pronotal punctures moderately large, deep and oval, separated by more than their diameters; interspaces shiny; hind angle with a very feeble obtuse carina.

Distribution: Dry mixed prairie from Saskatoon and Assiniboia, Sask., to Medicine Hat and Manyberries, Alta. Specimens: 17.

10. *Limonius sp. A*

This species comes within the presently recognized variation of *nitidulus* (M. C. Lane, in litt.). The male genital segments are similar to *nitidulus* but the anterior margin of the front is emarginate and the antenna is somewhat serrate.

Length 6.8-8.0 mm. Black; antenna, legs and epipleuron brown. Pubescence moderately dense, short and white, without longer upright hairs. Antennal segments moderately large, the second a little shorter than the third. Anterior margin of frons complete and rimlike, shallowly emarginate at center; prosternal suture definitely excavate in front. Pronotal punctures small and deep, separated by about their diameters on the disk, closer at the sides; interspaces shiny but not polished; hind angle with a strong carina next outer margin. Elytral intervals flat, finely roughened and punctulate.

Distribution: Dry grassy hillsides at Medicine Hat, Irvine and Walsh, Alta., and at Val Marie and Elbow, Sask. Specimens: 13.

11. *Limonius nitidulus* Horn

Length 5.0-6.5 mm. Black; antenna, legs and epipleuron often brown. Pubescence short and fine, white, without longer upright hairs. Antennal segments small and narrow, the third longer than the second. Anterior margin of frons complete and rimlike, transverse or arcuate; prosternal suture definitely excavate in front. Pronotal punctures small, round and deep, separated by more than their diameters; interspaces polished; hind angle with strong carina next outer margin.

This species is widely distributed and very variable. It can probably be divided into a number of subspecies, and the species recognized as *sp. A* in this summary may be one of these.

Distribution: Waterton, Alta. Specimens: 5.

Genus *Oxygonus* LeConte

Anterior part of front depressed in the center much as in *Ctenicera*, the margin not rimlike. Thorax as in *Ctenicera;* prosternal suture not excavate in front. Tarsal claws each with a large basal tooth. Elytral striae distinct.

Oxygonus obesus (Say) Fig. 15

Length 13.0-16.0 mm. Reddish brown; pronotum, head and underside usually darker brown. Pronotal pubescence dense, golden; elytral pubescence short and sparse. Hind angle of pronotum without carina; pronotal punctures

small and fine. Male elytra drawn out at the apices; last ventral abdominal segment long and pointed, the apex hooked ventrad in the male, but more normal in the female.

Distribution: Winnipeg, Beausejour, Stonewall and north of Lake Winnipeg, Man., and Lethbridge, Alta. One series was collected on underbrush on the riverbank at Winnipeg. Specimens: 16.

Genus *Hemicrepidius* Germar

Anterior part of front depressed in the center; anterior margin complete, a little raised above clypeus. Prosternal suture not excavate in front; prosternal lobe long, with convex margin; posterior margin of propleuron emarginate. Elytral striae distinct. Tarsal segments one to four with membranous pads at the apices below; claws simple.

Hemicrepidius is closely related to *Athous*, differing chiefly in the prolongation of the hind angle of the pronotum. In the species in this area, the front is depressed in the center much as in species of *Ctenicera*, whereas in *Athous* the anterior margin of the front is distinctly raised.

Horn (1880) reviewed the species under the generic name *Asaphes* Kby.

Key to Species

1. Pubescence long, dense and erect, imparting a velvety appearance to dorsal surface; hind angle of pronotum rounded or bluntly pointed when viewed from below ..... 1. *brevicollis* Cand.
   Pubescence short, sparse and depressed; hind angle of pronotum usually narrowly truncate when viewed from below 2
2. Posterior part of propleuron in front of marginal area shiny and not punctate; antenna and legs reddish; antennal segments nearly twice as long as broad 2. *memmonius* (Hbst.)
   Propleuron punctate to the marginal area; antenna and legs dark brown or black; antennal segments slightly longer than broad 3
3. Pubescence pale yellow; pronotal punctures contiguous at the sides giving a dull appearance ..... 3. *carbonatus* LeC.
   Pubescence dark brown; pronotal punctures clearly separated, the surface shiny ... 4. *sp. A*

1. *Hemicrepidius brevicollis* Candeze

Length 13.0-18.0 mm. Brown or brownish black, the head and pronotum usually darker; antenna and legs brown. Pubescence long, dense and erect, pale yellow. Antennal segments long and narrow; sixth antennal segment two-thirds as broad as long. Hind angles of pronotum convergent at apices, the apices rounded or pointed as viewed from below. Pronotal punctures moderate, separated by their diameters on the disk but closer at the sides; interspaces polished; propleuron shiny and not punctate in front of marginal area.

Distribution: Parklands from Gimli and Winnipeg to Virden in southern Manitoba. Specimens: 26.

2. *Hemicrepidius memnonius* (Herbst)

Length 14.0-18.0 mm. Rich brown, the head and pronotum usually darker; antenna and legs reddish brown. Pubescence very short and sparse, depressed or semi-erect, golden. Antennal segments four to eleven long and narrow; sixth segment twice as long as wide. Hind angles of pronotum convergent at apices, the apices usually obliquely truncate when viewed from below. Pronotal punctures moderate, separated by half their diameters on the disk, practically contiguous at the sides; interspaces shiny; propleuron shiny and not punctate in front of marginal area.

Distribution: Mixed prairie and parklands from Winnipeg and Gimli, Man., to Lethbridge, Alta. The larvae are often abundant in garden soil. The adults fly to lights during July and August. Specimens: 130.

3. *Hemicrepidius carbonatus* LeConte

Length 12.0-18.0 mm. Very dark brown or black; antenna and legs blackish. Pubescence short and moderately dense, prostrate, pale yellow. Antennal segments short and broad, a little longer than broad. Hind angles of pronotum not convergent at apices, the apices blunt and very short. Pronotal punctures moderate, separated by less than half their diameters on the disk, contiguous at the sides; interspaces not polished, the pronotum with a dull, opaque appearance at the sides; propleuron punctate to the marginal area.

Distribution: Mixed prairie and parklands of the southern half of the area, from Winnipeg and Morden, Man., to Lethbridge and Pincher, Alta. At Saskatoon, Sask. larvae have been collected in garden soil. Specimens: 75.

4. *Hemicrepidius sp. A*

Length 10.0-14.0 mm. Black or dark brown; antenna and legs dark. Pubescence very short and sparse, dark brown or black. Antennal segments short and broad, a little longer than broad. Hind angles of pronotum not convergent at apices, the apices blunt and short. Pronotal punctures small, separated by about their diameters on the disk, closer at the sides; interspaces polished; propleuron punctate to the marginal area.

Distribution: Lethbridge, Medicine Hat, and Cypress Hills, Alta. Specimens: 5.

Genus *Athous* Eschscholtz

Anterior part of front with a conspicuous depression behind the raised rim-like margin in our species; antenna 11-segmented. Prosternal lobe moderately long, the margin broadly curved; prosternal suture not excavate in front; hind angle of pronotum not prolonged beneath, the posterior margin of the propleuron not emarginate. Elytral striate distinct. Tarsal segments one to four with small felty or membranous pads at the apices below; claws simple.

Athous is closely related to *Hemicrepidius*, differing chiefly in the lack of prolongation of the hind angle of the pronotum. The species in this region have a distinctly elevated front and are readily separated from our *Hemicrepidius* by this character.

A key to the species may be found in Van Dyke (1932: 360).

Key to Species

1. Hind angle of pronotum without carina; tarsal segments felty beneath; reddish brown ..... 3. *rufifrons* (Rand.)
   Hind angle of pronotum with carina close to outer margin; tarsal segments with membranous pads below 2
2. Pubescence golden; pronotal punctures large and shallow, separated by about half their diameters ..... 2. *rufiventris* (Esch.)
   Pubescence brown or black with some admixture of paler hairs at the margins; pronotal punctures smaller ..... 1. *nigropilis* Mots.

1. *Athous nigropilis* Motschulsky

Length 9.0-12.0 mm. Brownish black; antenna and legs brown. Pubescence very short, brown or black with some admixture of paler hairs at the margins. Pronotum as broad as long, the sides curved and convergent in front;

hind angle with carina near outer margin. Pronotal punctures moderately large and shallow, separated by about their diameters or a little less on the disk. Tarsal segments with membranous pads below.

Distribution: Medicine Hat, Lethbridge, and MacLeod, Alta. The larvae live in rotting cottonwood logs. Specimens: 8.

2. *Athous rufiventris* (Eschscholtz)

Length 9.0-12.0 mm. Black or dark brown; abdomen, elytra, antenna, and legs reddish brown. Pubescence short, golden. Pronotum obviously longer than broad, the sides nearly parallel; hind angle with a fine carina. Pronotal punctures large and shallow, separated by about half their diameters; interspaces polished. Tarsal segments with membranous pads below.

Distribution: Waterton, Alta.; on lodgepole pine. Specimens: 3.

3. *Athous rufifrons* (Randall)

Length 11.0-14.0 mm. Brown; sides of pronotum, center of each elytron, antenna, and legs usually paler. Pubescence very short, yellow. Pronotum a little longer than broad, the sides gently curved and convergent in front; hind angle without a carina. Pronotal punctures moderately large and dense, separated by less than their diameters; interspaces shiny. Tarsal segments with felty pads below.

Distribution: Husavick, Man. Specimens: 2.

Genus *Denticollis* Piller and Mitterpacker

Anterior part of front with a conspicuous depression behind the raised, rimlike margin; antenna 11-segmented. Prosternal lobe very short, truncate; prosternal suture not excavate in front; metasternum pointed between middle coxae. Elytral striae distinct. Tarsal segments one to four with membranous or felty pads at the apices below; claws simple.

This genus resembles *Athous*, but has short, truncate prosternal lobe, and anteriorly pointed metasternum.

Becker (1952) revised the genus, and Lane (1949) corrected the generic synonymy.

Key to Species

Lateral and anterior margins of pronotum yellow; each elytron with a longitudinal yellow stripe and pale outer margin ..... 1. *denticornis* (Kby.)

Pronotum black with lateral margins and posterior angles red; elytra black ..... 2. *productus* (Rand.)

1. *Denticollis denticornis* (Kirby)

Length 10.0-12.0 mm. Black; clypeus, apex of head, broad margins of pronotum, trochanters, costal margin, and broad stripe on each elytron yellow. Pubescence fine, golden. Pronotum wider than long, the lateral margins sinuate. Pronotal punctures large and shallow, contiguous. Tarsal segments with felty pads below. Aedeagus with toothlike projections on each side.

This species superficially resembles a lampyrid beetle and is readily recognized by the bicolored body.

Distribution: Boreal forests from Victoria Beach and Gimli, Man., to Edmonton and Athabasca, Alta., and in the Spruce Woods Forest Reserve east of Brandon, Man. Specimens: 10.

2. *Denticollis productus* (Randall)

Length 12.0-14.0 mm. Black; narrow lateral margins of pronotum and legs reddish. Pubescence long and yellow. Pronotum longer than wide, evenly convex; punctures small to moderate, not contiguous. Tarsal segments with membranous pads below. Aedeagus without teeth at the sides.

This species resembles species of *Athous* but has a more depressed form, short truncate prosternal lobe, anteriorly pointed metasternum, and expanded and reddish lateral pronotal margins. It is the largest North American *Denticollis*.

Distribution: Victoria Beach, Man., and Lac la Ronge, Sask. Specimens: 3.

Genus *Pityobius* LeConte

Anterior part of front with a conspicuous, triangular depression behind the raised, rimlike margin; antenna 12-segmented. Anterior prosternal lobe short and truncate; prosternal suture not excavate in front. Elytral striae distinct. Tarsal segments one to four with membranous pads below at apices; claws simple.

Pityobius anguinus LeConte

Length 25.0-35.0 mm. Dark brown; antenna and legs usually paler. Pubescence fine and sparse, yellow. Antennal segments beyond the third bipectinate in the male, the rays three or four times as long as the segment; female antennal segments not pectinate. Pronotum very rough, with a deep median sulcus and lateral depressions. Pronotal punctures very large and shallow, contiguous; hind angle long and pointed, with a feeble carina.

Distribution: Forests of Manitoba and eastern Saskatchewan; usually collected under spruce and pine bark. Specimens: 6.

Genus *Conoderus* Eschscholtz

Anterior part of front nearly flat, the margin rimlike and distinctly raised above the clypeus. Prosternal suture curved outwardly in front and not excavate; hind coxal plate broad inside, the slope abrupt and the free angle rounded but approaching 90 degrees. Elytral striae distinct. Fourth tarsal segment with a small membranous pad below; claws each with a bristle at the basal third.

A key to the species may be found in Van Dyke (1932: 294).

Conoderus auritus (Herbst) Fig. 61

Length 4.5-6.5 mm. Dark brown or reddish brown; pronotum reddish with a pair of elongate darker spots; elytra dark brown or black; or paler with a pattern of dark markings. Pubescence short and fine, brownish yellow. Pronotal punctures small and fine, larger and more widely spaced on the anterior half but grading to very fine toward the posterior margin; hind angle with a strong carina.

Distribution: Dry mixed prairie at Medicine Hat and Lethbridge, Alta., and at Carberry and Wawanesa, Man. Specimens: 5.

Genus *Drasterius* Eschscholtz

Anterior part of front gently convex, the margin rimlike and distinctly raised above the clypeus. Prosternal suture nearly straight, not excavate in front; hind coxal plate wide inside, the slope moderately to sharply abrupt, and the free angle usually rounded. Elytral striae distinct. Tarsal segments and claws simple.

This genus has usually been defined to include *Aeolus* Esch. but appears quite distinct. A key to the species was published by LeConte (1884: 4).

Drasterius debilis LeConte

Length 4.0-5.0 mm. Color variable, usually blackish with antenna, legs and hind angle of pronotum reddish; elytra brown, usually with a darker central area. Pubescence short and sparse, golden. Pronotal punctures small and widely spaced, the surface shiny. Tarsi long and slender, finely haired below.

Distribution: Banff and Jasper, Alta., and from north of Lake Winnipeg, Man.; on spruce and fir. Specimens: 4.

Genus *Aeolus* Eschscholtz

Anterior part of front flat, the margin rimlike and distinctly raised above the clypeus. Prosternal suture straight, not excavate in front. Hind coxal plate broad inside, the slope abrupt and the free angle rounded but approaching 90 degrees. Tarsal segments simple; claws each with a single bristle at the basal third.

This genus has usually been united with *Drasterius* Esch. Brown (1933: 133) discussed the single Canadian species.

Aeolus mellillus (Say) Figs. 62-64

Length 5.5-8.0 mm. Reddish yellow; head, usually the underside of abdomen, median dorsal pronotal spot, and variable markings on elytra black. Hind angle of pronotum long and slender, with a strong carina.

The species is very variable both in size and color. Brown (1933) separated three races by color and a certain trend in distribution. Glen, King and Arnason (1943) found no larval differences among the races.

Brown separated the three races as follows:

"1. Dorsum bicolored, the pronotal black spot elongate-oval or lanceolate; each elytron with an anterior black spot which never attains the suture or the posterior black band; eastern ..... *mellillus mellillus* (Say)

Dorsum more or less bicolored but with the black markings more extensive; the pronotal black spot usually broadly oval; anterior spot of each elytron always joined to the posterior black markings, these black areas sometimes extended over the disk; western 2

2. Pronotal spot occupying not more than half of the pronotal area; black markings of the elytra less extensive, not attaining the scutellum or elytral base; B.C. and Alta. ..... *mellillus comis* (Lec.)

Pronotal spot usually occupying more than half of the pronotum; black markings of the elytra usually attaining the scutellum, often extending to the lateral margin anteriorly and to the basal margin; Sask. and Man. ..... *mellillus marginicollis* (Horn)"

In the Prairie Provinces the three "races" do not appear to represent subspecies. The form *mellillus* is the most stable, shows very little variation in the size of the black spots, and is uniformly smaller; it has been collected only infrequently on the "blow-sand" areas of Manitoba (Carberry), Saskatchewan (Saskatoon, Elbow) and Alberta (Medicine Hat, Manyberries). The forms *comis* and *marginicollis* are very variable both in size and in the extent of the black markings; typical specimens and intermediates between the two have been collected in many localities throughout the grasslands, including those inhabited by typical *mellillus*.

The species reproduces parthenogenetically in this area, and the life-cycle normally takes one year. It prefers drier situations in native grasslands and is usually found under stones, sticks or dry manure. Specimens: 85.

Genus *Oedostethus* LeConte

Anterior part of front flat, the margin rimlike and distinctly raised above the clypeus. Prosternal lobe relatively short, the margin gently curved; posterior margin of propleuron with a broad triangular tooth in the center; prosternal suture curved outwardly; hind coxal plate broad inside, the slope abrupt and the free angle obtuse. Elytral striae rather poorly impressed except in front. Tarsal segments simple; claws each with a low basal tooth.

This genus is very similar to *Negastrius*. In addition to the low basal tooth of each claw, the hind coxal plate is much less expanded on the inside than in *Negastrius*. In *Oedostethus* the broadest part of the coxal plate is about 2½ times as wide as the narrowest, and the free angle is about 60 degrees; in *Negastrius* the broadest part of the coxal plate is about five times as wide as the narrowest and the free angle approximates 90 degrees.

The genus contains only one species.

Oedostethus femoralis LeConte Figs. 13, 19

Length 3.5-4.5 mm. Black; antenna and legs brown. Pubescence short, appressed and fine, pale yellow or whitish. Pronotum about as long as broad, convex, the sides evenly curved; hind angle with strong carina. Pronotal punctures pinpricklike, separated by about twice their diameters; interspaces shiny. Elytral striae feebly impressed except in front.

Distribution: Widely distributed in the prairies, parklands and parkland-like situations within the forests; in moist grassy spots around margins of ponds or in meadows. Specimens: 60.

Genus *Negastrius* Thomson

Anterior part of front flat, the margin rimlike with a fine raised bead. Prosternal lobe moderately long, the margin convex; prosternal suture curved outwardly; posterior margin of propleuron produced as a triangular tooth; hind coxal plate broad toward inside, the slope abrupt and the free angle approximating 90 degrees. Tarsal segments and claws simple.

Species of *Negastrius* and *Oedostethus* are readily distinguished from others in the area by their small size (2.0-5.0 mm.), the prominent triangular tooth on the margin of the propleuron, and the divided male paramere. *Negastrius* (formerly *Hypnoidus*) has usually been united with *Hypolithus* (formerly *Cryptohypnus*).

Horn (1891) revised the genus under the name *Cryptohypnus*, and Lane (1948: 221) corrected the generic synonymy.

Key to Species

1. Striae of elytra obliterated ..... 1. *pectoralis* (Say)
   Striae of elytra entire, conspicuous 2
2. Elytra with yellow markings 3
   Elytra without yellow markings 4
3. Median line of pronotum raised; pronotum very coarsely granulate; basal antennal segments and legs pale ..... 2. *choris* (Say)
   Median line of pronotum not raised; pronotum finely punctate and shiny; antenna and femora black ..... 3. *gentilis* (LeC.)
4. Pronotum depressed, granulate and dull, the median line conspicuous; elytra brown or reddish ..... 5. *striatulus* (LeC.)
   Pronotum not depressed, shiny or subshiny 5
5. Antenna and legs black ..... 4. *sp. A.*
   Some segments of antenna or legs brown or yellow 6

6. Pronotal punctures very small, shallow, widely spaced; pronotum shiny black; second and third antennal segments, tibiae, and tarsi bright yellow ..... 7. *tumescens* (LeC.)
Pronotal punctures larger, shallow, narrowly separated; opaque brownish black species; antennal segments and legs brownish ..... 6. *dubius* (Horn)

1. *Negastrius pectoralis* (Say)

Length 2.5-3.5 mm. Variable in color; wholly pale yellow with pale brown bar and suture, or mostly brownish black with yellow appendages and oval spot on each elytron. Pubescence short, fine and appressed, pale yellow. Pronotum somewhat flattened, broader than long and broadest at center; hind angle very short with divergent tip; median line differentiated but not raised. Pronotal punctures small and shallow, separated by about their diameters, the surface not shiny; propleuron dull. Elytral striae absent, the surface finely and rather densely punctulate.

Distribution: Sandy sites at Medicine Hat and Stavely, Alta. and at Wawanesa and Husavick, Man. Specimens: 10.

2. *Negastrius choris* (Say)

Length 3.5-4.5 mm. Black; prosternal lobe yellow; elytron black or brownish, paler posteriorly and at sides, with a larger anterior yellow spot or bar, and a smaller round spot on posterior half; basal three antennal segments and legs yellow. Pubescence short, appressed and rather scanty, pale yellow. Pronotum convex, broader than long, the sides evenly curved and converging both in front and behind; median line of pronotum raised and smooth. Pronotum very roughly sculptured and dull, with closely placed series of ridges and rounded tubercles; propleuron dull. Elytral striae deeply impressed.

Distribution: Sandy or gravelly dunes throughout the area. Specimens: 25.

3. *Negastrius gentilis* (LeConte)

Length 3.0-4.0 mm. Black; prosternal lobe, tip of hind angle of pronotum, and posterior margin of propleuron reddish; antenna and femora dark; elytron mostly black, with an elongate anterior, and a round posterior yellow spot, the epipleuron and narrow margin brown. Pubescence short and appressed, white or yellowish. Pronotum convex, broader than long; median line not raised but without punctures. Pronotal punctures small, round and deep, separated by about their diameters; interspaces shiny; propleuron similar. Elytral striae deeply impressed.

Distribution: Kimball, Lethbridge, MacLeod, Medicine Hat, Red Deer, Drumheller and Edmonton, Alta., and at Saskatoon and Prince Albert, Sask. One series was collected on the muddy banks of St. Mary's river south of Lethbridge associated with *Bembidion* spp. Specimens: 25.

4. *Negastrius* sp. A

This appears to be an undescribed species (M. C. Lane in litt.).

Length 3.5-4.2 mm. Black; legs and epipleuron dark brown. Pubescence short and appressed, white on pronotum, mostly brownish yellow on elytra. Pronotum convex, broader than long, the sides curved but more convergent in front; median line differentiated but not raised. Pronotal punctures small, round and deep, separated by about their diameters; interspaces shiny; propleuron similar. Elytral striae deeply impressed.

Distribution: MacLeod, Lethbridge, Medicine Hat and Edmonton, Alta. A series was collected in a clover and grass pasture at Lethbridge associated with *Oedostethus femoralis*. Specimens: 16.

5. *Negastrius striatulus* (LeConte)

Length 2.5-3.5 mm. Black; elytra reddish or brownish black, the epipleura paler; antenna and legs brownish yellow. Pubescence short and appressed, pale yellow or white. Pronotum flattened, broader than long, the sides evenly curved; hind angle with one rather low, obtuse carina nearer outer margin; median line obvious, a little raised and smooth. Pronotum dull, the whole surface roughened but without distinct punctures; propleuron similar. Elytral striae deeply impressed.

Distribution: Pincher Creek and Medicine Hat, Alta. Specimens: 10.

6. *Negastrius dubius* (Horn)

Length 2.5-3.0 mm. Brownish black; hind angle of pronotum and ventral surface more brownish yellow; antenna and legs brownish yellow; elytra brownish black, paler at sides. Pubescence short and appressed, pale yellow. Pronotum feebly convex, broader than long, the sides evenly curved; median line not differentiated. Pronotal punctures very shallow, poorly formed and close together, producing a slight roughened effect; propleuron shiny with shallow punctures. Elytral striae distinct.

N. dubius closely resembles *N. striatulus* in the dull, opaque grey appearance, and in the pronotal puncturation. *N. dubius* is smaller with more convex pronotum, the carina of the hind angle of the pronotum is approximately in the center of the angle, the central line of the pronotum is not differentiated, and the elytra are approximately concolorous with the pronotum.

Distribution: Dry mixed prairie area from Lethbridge and Edmonton, Alta., to Brandon, Man. The species occupies the driest sites and is most abundant on south-facing slopes. Specimens: 120.

7. *Negastrius tumescens* (LeConte)

Length 3.0-3.5 mm. Black; second and third antennal segments generally reddish; legs mostly yellow, the femora darker. Pubescence short, fine and appressed, pale yellow or brown. Pronotum conspicuously convex, much broader than long, the sides curved but more convergent in front; hind angle with a rather obtuse, feeble carina. Pronotum shiny, the punctures small and shallow, separated by about their diameters; propleuron similar. Elytral striae deeply impressed.

Distribution: From Waterton and McMurray, Alta. to Winnipeg, Man.; mostly shady spots in groves or forest margins. Specimens: 40.

Genus *Alaus* Eschscholtz

Anterior part of front depressed at center, the margin not rimlike. Thorax flattened and with a pair of velvety eye spots; entire body densely clothed with small scales. Tarsal segments simple; claws each with a group of bristles at the base.

Alaus myops (Fabricius) Fig. 18

Length 25.0-45.0 mm. Dark reddish brown or black, covered with white and intermixed brown, scalelike hairs; pronotal eye spots oval, separated by over twice the diameter of one spot.

This species is easily recognized by the oval eye spots on the pronotum, and by the large size. Our specimens are dark with more whitish scales and slightly smaller eye spots than typical *myops;* they belong to the color variety formerly identified as *canadensis* Cand.

Distribution: From Beausejour to Piney in southeastern Manitoba; on pine. Specimens: 5.

Genus *Lacon* Laporte de Castelnau

Anterior part of front depressed or hollowed-out behind the complete rim-like margin. Prosternal suture deeply excavate for the reception of the antenna. Entire body densely clothed with scales; elytral striae obliterated. Tarsal segments and claws simple.

The genus was revised by Arnett (1952, 1953); Lane (1953) corrected the generic synonymy.

Key to Species

1. Propleuron with both shallow tibial and deep femoral grooves; length 11.0-13.0 mm. ..... 1. *auroratus* (Say)
   Propleuron with femoral groove only; length 11.5-17.0 mm. 2
2. Hind angles of pronotum convergent and blunt ..... 2. *brevicornis* (LeC.)
   Hind angles of pronotum divergent and acute ..... 3. *obtectus* (Say)

1. *Lacon auroratus* (Say)

Length 11.0-13.0 mm. Propleuron with shallow grooves for the tarsi in addition to deep femoral grooves; hind angle of pronotum divergent and slightly acute. Dark reddish brown or black; legs, hind angles of pronotum and propleuron, and epipleuron usually paler. Scales of prothorax mostly golden with brown scales intermixed; scales of elytra mostly brown with many yellow scales intermixed but not forming a pattern.

Distribution: Jackpine forests at Victoria Beach in eastern Manitoba and at Colinton, Alta. Specimens: 3.

2. *Lacon brevicornis* (LeConte)

Length 11.5-16.0 mm. Propleuron without tibial depression; hind angle of pronotum convergent at apex and bluntly rounded. Color variable; reddish brown or black, with brown and yellow scales; scales often forming a distinctive pattern on dorsal surface.

Two subspecies of *brevicornis* have been collected in the area; these may be separated as follows:

Shorter, usually less than 13.0 mm.; side margin of pronotum not following through to apex of hind angle, but stopping or entirely obscured by scales at base of angle; elytral scales usually more golden and pattern more diffuse; subalpine and montane forests ..... *profusus* (Cand.)

Longer, usually 14.0-16.0 mm.; side margin of pronotum complete or nearly complete to apex of hind angle; elytra usually with distinct yellow or grey spots at apical third; boreal forests from eastern Manitoba to western Alberta ..... *brevicornis* (LeC.)

L. profusus was considered a synonym of *brevicornis* by Arnett, but this view appears too conservative. Apparent intermediates between the two occur in the forests of western Alberta. Specimens: 35.

3. *Lacon obtectus* (Say)

Length 15.0-17.0 mm. Propleuron without tibial depression; hind angles of pronotum acute and divergent, the side margins of pronotum strong to apices. Dark reddish brown; pronotum black. Scales of dorsal surface white with intermixed brown scales, the total effect giving the body a grey marmorate appearance.

Distribution: Spruce and jackpine forests from eastern Manitoba to Athabasca, Alta. Specimens: 15.

Genus *Oestodes* LeConte

Anterior part of front nearly flat, sloping down to the clypeus, the margin not complete. Thorax cylindrical, the lateral margins not visible from above; prosternal lobe very short, truncate. Elytra translucent, the striae absent or very faint. Tarsal segments and claws simple.

Oestodes puncticollis Horn

Length 6.0-7.5 mm. Black or dark brown; elytra pale translucent yellow, the suture, anterior margin, and epipleura brown; tibiae and tarsi pale brown. Pubescence yellow, sparse, short and upright. Pronotal punctures large, round and shallow, separated by about their diameters. Elytral striae not evident, the surface sparsely but distinctly punctate.

Distribution: Locally distributed in the grasslands from Cardogan, Alta. to Carberry and Horton, Man. It occurs in the long grass around the margins of saline ponds. Specimens: 15.

Genus *Melanotus* Eschscholtz

Anterior part of front flat, the margin rimlike and distinctly raised above the clypeus. Prosternal suture excavate in front. Elytra tapered apically, the striae distinct. Tarsal segments without membranous lobes; claws pectinate.

Key to Species

1. Pronotum and propleuron bright reddish; elytra black ..... 3. *leonardi* (LeC.)
   Pronotum and elytra approximately concolorous, brown or black 2
2. Third antennal segment only slightly longer than second, the second and third together not more than three-fourths as long as fourth; length 15.0-20.0 mm. 1. *castanipes* (Payk.)
   Third antennal segment nearly twice as long as second, the second and third together as long as fourth; length 12.0-15.0 mm. ..... 2. *fissilis* (Say)

1. *Melanotus castanipes* (Paykull)

Length 15.0-20.0 mm. Wholly rich reddish brown with moderately long, erect, yellow pubescence. Third antennal segment a little longer than the second, the second and third together about three-fourths as long as the fourth. Pronotal punctures large, round and shallow, separated by about their diameters on the disk, but larger and irregular at the sides.

Distribution: Southern Manitoba east of Virden. Both larvae and adults are commonly found under dry manure in pastures. Specimens: 20.

2. *Melanotus fissilis* (Say)

This species belongs to the very difficult *fissilis-communis* complex, which at present is poorly understood. The present use of the name agrees with that of Dietrich (1945).

Length 12.0-15.0 mm. Wholly brown or brownish black, with moderately long, semi-erect yellow pubescence. Third antennal segment nearly twice as long as second, the second and third together as long as the fourth. Pronotal punctures large, round and shallow, separated by less than their diameters on the disk and closer at the sides.

Distribution: Southern Manitoba and southeastern Saskatchewan as far westward as Indian Head. It is found in habitats similar to those of *castanipes*. Specimens: 25.

3. *Melanotus leonardi* (LeConte)

Length 10.0-12.0 mm. Black; pronotum and propleuron bright reddish yellow with narrow black hind margins; antenna and legs brown. Pubescence semi-erect, white. Third antennal segment longer than second, the second and third together a little shorter than the fourth. Pronotal punctures rather small and shallow, separated by more than their diameters on the disk but closer at the sides.

Distribution: On a variety of evergreen and deciduous trees and shrubs in the Whiteshell Forest Reserve in eastern Manitoba. Specimens: 6.

Genus *Anchastus* LeConte

Anterior part of front convex, the margin rimlike and distinctly raised above the clypeus. Prosternal suture curved inwardly, excavate in front; lateral margin of pronotum joining prosternal suture, or stopping just short of this point; hind coxal plate broad inside, the slope abrupt and the free angle about 90 degrees. Elytral striae distinct. Third tarsal segment with a membranous lobe below at apex; claws simple.

A catalogue and key to species may be found in Van Dyke (1932: 319).

Anchastus cinereipennis (Eschscholtz)

Length 4.0-6.5 mm. Dark brown or brownish black with yellow pubescence. Hind angle of pronotum short and stout, with feeble carina. Pronotal punctures small and deep, moderately dense; interspaces shiny.

Distribution: Short mixed prairie at Medicine Hat, Manyberries, Irvine and Walsh in southeastern Alberta. Specimens: 5.

Genus *Sericus* Eschscholtz

Anterior part of front nearly flat, sloping down to the clypeus. Thorax somewhat flattened, the sides nearly straight and gently convergent in front; prosternal suture excavate in front; hind coxal plate rectangular or nearly so. Elytral striae deeply impressed. Tarsal segments and claws simple.

The species are similar in general appearance to *Agriotes* or large *Dalopius*. The head is less convex than in *Dalopius*, the mouthparts are anterior rather than ventral, and the hind coxal plate is nearly rectangular.

Sericus incongruus (LeConte)

Length 7.0-9.0 mm. Dichromatic: Females and some males reddish brown, the ventral surface, broad line on middle of pronotum, and elytral suture black; some males entirely dark brown or black, the elytra and legs brownish black. Pubescence very short, fine and sparse, brownish yellow. Pronotal punctures round, very shallow, umbilicate, separated by about their diameters; interspaces not shiny.

Distribution: Throughout the forested area of the three Provinces. Specimens: 75.

Genus *Dalopius* Eschscholtz

Anterior part of front convex much as in *Agriotes;* frontal carina incomplete. Thorax nearly cylindrical with sides approximately parallel; lateral margin of pronotum not joining prosternal-propleural suture (Fig. 23); prosternal suture shallowly excavate in front; hind coxal plate gradually widened toward inside. Tarsal segments and claws simple.

The most useful characters for identification are those of the male genital segments. The species are much alike otherwise, lacking strong or apparent

structural or color characters. The sculpture and vestiture is quite constant within the genus. Females may be difficult to determine except by association with the males.

Three groups may be separated on the color patterns of the elytra: *vagus* and *vernus* are basically black or dark brown, usually with a narrow, pale, longitudinal streak on each elytron; *mirabilis* and *inordinatus* are uniformly dark brown or reddish; *fucatus*, *insolens*, *parvulus*, *pallidus*, and *asellus* are reddish brown or yellow with costal margins and broad median stripe darker.

Brown (1934) revised the genus.

Key to Species

1. Phallobase very long; paramere membranous at the base, the margin very difficult to trace; paramere short, very small at apex; apodeme long (Fig. 69). Elytra black, usually with only humeri reddish (Fig. 65) ..... 1. *vagus* Bn.
   Phallobase small, shorter than aedeagus; paramere not membranous at base, the margins distinctly defined; apodeme short 2
2. Aedeagus serrate at the sides (Fig. 73). Elytra reddish yellow to dark brown without darker streaks or lines ..... 9. *mirabilis* Bn.
   Aedeagus not serrate at the sides 3
3. Elytron brownish black with a narrow reddish yellow stripe from humerus to near apex, but not usually attaining apex (Fig. 66) ..... 2. *vernus* Bn.
   Elytron reddish yellow or brown, usually with lateral margins and median line darker .. 4
4. Elytra dark reddish brown or reddish, without definite darker median line. Less than 5.0 mm. long ..... 8. *inordinatus* Bn.
   Elytra with darker lateral margins and median line (Figs. 67, 68) 5
5. Aedeagus spatulate or definitely enlarged toward apex 6
   Aedeagus not enlarged toward apex, the sides nearly parallel to the rounded apex 7
6. Paramere produced and pointed at inner apical corner, the apical margin plainly curved; aedeagus rather abruptly enlarged toward apex and without median carina (Fig. 72); more yellowish with brown pronotum ..... 6. *pallidus* Bn.
   Paramere not produced at inner apical corner, the apical margin nearly truncate; aedeagus evenly enlarged toward apex and with short median carina (Fig. 70); more reddish brown with black pronotum ..... 3. *fucatus* Bn.
7. Paramere produced and pointed at inner apical corner, the apical margin plainly curved 8
   Paramere not produced at inner apical corner, the apical margin nearly truncate (Fig. 77); genital segments shorter than in comparable species. Mountain and foothills ..... 4. *insolens* Bn.
8. Pronotum mostly shiny black with anterior margin and hind angles reddish; median dark stripe of elytra usually narrow (Fig. 68); apical margin of paramere long (Fig. 71); western half of area ..... 5. *asellus* Bn.
   Pronotum reddish brown to brownish black, the anterior margin and hind angles paler; median dark stripe of elytra broad (Fig. 67); apical margin of paramere relatively short (Fig. 76); eastern half of area ..... 7. *parvulus* Bn.

1. *Dalopius vagus* Brown Figs. 65, 69

Length 5.2-7.0 mm. Mostly dark brown or brownish black; basal antennal segments, anterior margin and hind angle of pronotum and margins of apical abdominal segments, reddish yellow; legs very pale reddish yellow. Elytron dark with a reddish yellow spot on the humerus, or occasionally the humeral spot extended about half way to the apex. Male genital segments as illustrated.

Distribution: Grassy pastures throughout southern Manitoba and in central Saskatchewan westward to Prince Albert. Specimens: 35.

2. *Dalopius vernus* Brown Figs. 66, 75

Length 5.0-6.3 mm. Mostly dark brown or brownish black; antenna, anterior margin and hind angle of pronotum, and margins of apical abdominal

segment, reddish yellow; legs very pale reddish yellow. Elytron dark with a reddish yellow stripe from humerus to near apex; in some specimens the pale elytral stripe is abbreviated much as in *vagus*. Male genital segments as illustrated.

Distribution: Winnipeg, Husavick and Gimli, Man. Specimens: 15.

3. *Dalopius fucatus* Brown Figs. 67, 70

Length 5.6-6.6 mm. Mostly black; anterior margin and hind angle of pronotum, and legs pale reddish brown. Elytra dark reddish, the lateral margins and central line black; central line variable, broad anteriorly and extending about two-thirds of way to apex. Male genital segments as illustrated.

This species is very similar to, but a little larger than *asellus*.

Distribution: Waterton to Jasper in the foothills, and at Medicine Hat, Alta. Specimens: 5.

4. *Dalopius insolens* Brown Fig. 77

Length 5.4-6.7 mm. Dark brown; basal segments of antenna, anterior margin and hind angle of pronotum, and legs reddish. Elytra with lateral margins and a broad central stripe black. Male genital segments as illustrated.

Distribution: Cowley, Alta. Specimens: 2.

5. *Dalopius asellus* Brown Figs. 68, 71

Length 4.7-5.8 mm. Blackish; basal antennal segments, anterior margin and hind angle of pronotum, and legs red. Elytra dark reddish with lateral margins and central line black; central line very variable in width, extending about two-thirds of way to apex. Male genital segments as illustrated.

This species is darker than *pallidus*. Specimens from western Alberta are considerably larger than others.

Distribution: North-central Saskatchewan, west of Saskatoon and Christopher Lake; northwestern Alberta; and foothills of western Alberta; and the Cypress Hills of southern Alberta and Saskatchewan; grassy pastures and forest margins. Specimens: 55.

6. *Dalopius pallidus* Brown Fig. 72

Length 5.0-6.8 mm. Reddish yellow; legs paler; head, a large cloud on pronotum, and abdomen except apical segment, pale reddish brown. Elytra pale reddish yellow with lateral margins and central stripe darker. Male genital segments as illustrated.

This species is very similar to, but larger and more reddish than *parvulus*.

Distribution: Prairies and parklands from near the Ontario boundary to Edmonton and Lethbridge, Alta. Specimens: 120.

7. *Dalopius parvulus* Brown Fig. 76

Length 4.3-5.0 mm. Reddish and yellow; ventral surface, head and pronotal disk reddish brown. Elytra mostly yellowish, the lateral margins and broad central stripe dark. Male genital segments as illustrated.

This species closely resembles some specimens of the slightly larger and more reddish *pallidus*.

Distribution: Eastern half of the area from Christopher Lake, Saskatoon and Wood Mountain, Sask.; to Whitemouth and Reynolds, Man. Specimens: 75.

8. *Dalopius inordinatus* Brown Fig. 74

Length 4.3-4.6 mm. Body short in proportion to its width, distinctly more robust and convex than usual. Very dark brown; antenna, and the anterior margin and hind angle of pronotum, reddish brown. Elytra reddish brown without distinct darker lines. Male genital segments as illustrated.

This species resembles *Agriotes criddlei* very closely. It differs from *criddlei* in the shiny pronotum, simple pronotal punctures, and less excavate prosternal suture. The lateral margin of the pronotum joins the anterior margin very close to the propleural-prosternal suture.

Distribution: Cypress Hills of southern Saskatchewan and Alberta; abundant in grassy meadows associated with *Agriotes criddlei*. Specimens: 25.

9. *Dalopius mirabilis* Brown Fig. 73

Length 5.0-7.0 mm. Body shorter and more robust than usual. Very variable both in color and size but in all color phases the elytra lack any pattern. Elytra light reddish, brown, or brownish black. Male genital segments as illustrated.

Specimens from the more densely treed parkland areas of central and northern Manitoba and eastern Saskatchewan, are generally smaller and much darker than those from southwestern and western localities.

Distribution: Prairies and parklands of the entire area; more abundant in the parklands. Specimens: 155.

Genus *Agriotes* Eschscholtz

Anterior part of front convex, more or less helmetlike (Fig. 10); frontal carina not complete. Sides of thorax nearly parallel; lateral margin of pronotum joining propleural-prosternal suture in front (Fig. 24); prosternal sutures broadly excavate in front. Tarsi and claws simple.

Becker (1956) revised the North American species.

Key to Species

1. Length 4.5-5.5 mm.; black or brown ..... 1. *criddlei* V.D.
   Length over 6.0 mm. 2
2. Hind coxal plate very abruptly enlarged inwardly, the free angle about 90 degrees; length 6.0-7.5 mm.; dark brown ..... 2. *opaculus* (LeC.)
   Hind coxal plate gradually dilated inwardly, the free angle obtuse 3
3. Pronotal punctures uneven, very fine on posterior half, coarse on anterior half ..... 3. *stabilis* (LeC.)
   Pronotal punctures coarse throughout 4
4. Sides of pronotum broadly and contrastingly red; elytra black ..... 4. *fucosus* (LeC.)
   Pronotum usually unicolored, without a well-defined median stripe 5
5. Side margin of pronotum interrupted and very weak on anterior half; pronotal punctures coarse and deep; pronotum broader than long; form robust ..... 10. *mancus* (Say)
   Side margin of pronotum strong throughout; pronotal punctures shallow; pronotum longer than broad 6
6. Prothoracic hair shiny golden; elytra reddish, pronotum and head black 7
   Prothoracic hair dull yellowish white; color of elytra and pronotum usually not contrasting 8
7. Pronotal punctures larger, contiguous on disk; length 9.0-11.0 mm.; hind angle of pronotum usually extensively reddish ..... 6. *tardus* Bn.
   Pronotal punctures smaller, separated by half their diameters on disk; length 8.0-10.0 mm.; hind angle of pronotum usually only narrowly red laterally ..... 5. *limosus* (LeC.)
8. Southwestern Alberta ..... 7. *ferrugineipennis* (LeC.)
   Southeastern Manitoba 9

9. Metasternal punctures much finer and more widely spaced than propleural punctures; pronotal punctures larger and shallower, narrowly separated ..... 8. *quebecensis* Bn.
Metasternal punctures nearly as large as propleural punctures; pronotal punctures deeper, separated by about half their diameters ..... 9. *pubescens* Melsh.

1. *Agriotes criddlei* Van Dyke

Length 4.5-5.5 mm. General color very dark brown; elytra, antenna and underside usually lighter brown. Pubescence moderately dense, grey. Pronotal punctures shallow and umbilicate, nearly contiguous on the disk; interspaces sub-shiny. Hind coxal plate rather abruptly expanded toward inside; lateral pronotal margin entire.

A. criddlei closely resembles species of *Dalopius*. The dull pronotum (due to larger, shallower punctures), and the more excavate prosternal suture distinguish *criddlei*.

Distribution: Moderately abundant on the prairies of the southern third of the area from Waterton and Wetaskiwin, Alta., eastward to Stonewall, Man.; more abundant in meadows of the Cypress Hills than on the mixed prairie. Specimens: 65.

2. *Agriotes opaculus* (LeConte)

Length 6.0-7.5 mm. Dark brown; anterior lobe of prosternum, hind angle of pronotum, antenna and legs, paler. Pubescence very short, yellowish or brown. Pronotal punctures moderate, nearly contiguous on disk, shallower on sides and on propleuron; interspaces shiny. Lateral pronotal margin entire; hind coxal plate abruptly expanded to the inside, the free angle a little over 90 degrees.

Distribution: Pincher Creek, Alta. (July 15, 1929, Carr). Specimens: 2.

3. *Agriotes stabilis* (LeConte)

Length 8.0-12.0 mm. Black or brown; head and ventral surface usually darker. Pubescence finer and less dense on posterior half of pronotum than on anterior half, yellow. Pronotal punctures extremely small and dense on posterior half, these grading into coarse, shallow, umbilicate punctures on anterior half. Lateral pronotal margin complete; hind coxal plate gradually widened toward inside.

This is the only American species with uneven pronotal punctures.

Distribution: Parklands of Manitoba and eastern Saskatchewan as far westward as Indian Head and Hudson Bay Junction. The distribution appears more localized than *fucosus* but in the same general habitats; usually collected on hazel, dog wood, and willow near small ponds within larger deciduous forest communities. Specimens: 35.

4. *Agriotes fucosus* (LeConte)

Length 10.0-13.0 mm. Black or very dark brown except prothorax; pronotum mostly red with a well-defined black median spot and black hind angles; upper part of propleuron usually reddish; antenna brown. Pubescence short, greyish yellow. Pronotal punctures moderate on the disk, separated by about half their diameters; interspaces dull. Lateral pronotal margin entire; hind coxal plate gradually enlarged toward inside.

Distribution: Parklands of Manitoba and eastern Saskatchewan, northwestward to Edmonton and Lacombe, Alta., and in the Wood Mountains of southern Saskatchewan. It may be collected on undergrowth in moderately dry situations. Specimens: 74.

5. *Agriotes limosus* (LeConte)

Length 8.0-9.5 mm. Black; antenna, legs, hind angle of pronotum on outer side and elytra reddish brown. Pubescence short and sparse, shiny golden. Pronotal punctures small and shallow, separated by about their diameters on the disk, closer at the sides and on propleuron; interspaces subshiny. Lateral pronotal margin entire; hind coxal plate gradually enlarged toward base or sinuate.

A. limosus closely resembles *A. tardus* but is smaller, with sparser and smaller pronotal punctures.

Distribution: Boreal and northern subalpine forests from eastern Manitoba to Banff and Jasper, Alta., and in the Cypress Hills of southern Alberta. Specimens: 95.

6. *Agriotes tardus* Brown

Length 9.0-10.5 mm. Black; hind angle and posterolateral margin of pronotum, elytra, antenna and legs, reddish brown. Pubescence short and sparse, shiny golden. Pronotal punctures coarse, nearly contiguous on the disk, shallower and closer at the sides; interspaces shiny. Lateral pronotal carina entire; hind coxal plate gradually enlarged toward base.

A. tardus is closely related to *A. limosus* but is larger and has coarser pronotal punctures. It resembles some specimens of *ferrugineipennis;* in *tardus* the second antennal segment is longer than the third whereas in *ferrugineipennis* it is shorter.

Distribution: From Waterton to Banff in southwestern Alberta; on pine and spruce. Specimens: 16.

7. *Agriotes ferrugineipennis* (LeConte)

Length 9.0-12.0 mm. Color variable; dark brown to light brown; head, ventral surface and usually the pronotum black; hind angle of pronotum, antenna, legs and elytra, reddish brown. Pubescence conspicuous, greyish yellow. Pronotal punctures coarse, umbilicate, nearly contiguous to separated by nearly half their diameters; interspaces shiny. Lateral pronotal margin entire; hind coxal plate rather abruptly enlarged inwardly.

A. ferrugineipennis resembles some specimens of *tardus,* but in *ferrugineipennis* the second antennal segment is shorter than the third whereas in *tardus* it is longer.

Distribution: Waterton and Kimball to Lethbridge and Banff in southwestern Alberta. Specimens: 24.

8. *Agriotes quebecensis* Brown

Length 8.5-10.0 mm. Dark brown or black; elytra frequently paler than pronotum; antenna and legs light brown. Pubescence conspicuous, greyish yellow. Pronotal punctures moderate, shallow, separated by less than their diameters on the disk but larger and shallower on propleuron; metasternal punctures very small; interspaces subshiny to dull. Lateral pronotal margin complete; hind coxal plate gradually widened toward inside.

A. quebecensis is very similar in general appearance to *pubescens.* The most reliable separating features are the characteristic punctures of propleuron and metasternum.

Distribution: Victoria Beach, (Roberts, May 24, 1928), and Headingley, Man. Specimens: 2.

9. *Agriotes pubescens* Melsheimer

Length 8.0-10.0 mm. Dark brown or blackish; elytra frequently paler than pronotum; antenna and legs brown. Pubescence conspicuous, whitish or yellowish grey. Pronotal punctures moderate, rather deep, separated by about half their diameters on the disk, larger and closer on the sides and on propleuron; metasternal punctures similar; interspaces shiny. Lateral pronotal margin complete; hind coxal plate gradually widened toward inside.

A. pubescens resembles *quebecensis* very closely. The coarser and closer punctures of the propleuron and metasternum of *pubescens* differ from the shallow, umbilicate punctures of the propleuron and much finer punctures of the metasternum of *quebecensis.*

Distribution: Winnipeg, Man. (Wallis, 1920); probably occurs southward in the Red River Valley into Minnesota (Becker, 1956). Specimens: 8.

10. *Agriotes mancus* (Say)

Length 6.5-8.5 mm. Body robust. General color brown; pubescence golden. Mandible broad and chisel-like; head very convex and projecting forward considerably from bases of antennae. Pronotum wider than long; pronotal punctures moderate, deep and contiguous; interspaces subshiny. Lateral pronotal margin usually absent on anterior half; hind coxal plate gradually enlarged to the inside.

This is our only species with very broad mandibles, subquadrate pronotum, and reduced lateral pronotal carina.

Distribution: In and around cultivated fields from Winnipeg and Arnaud, Man. westward to Roche Percee, Sask. Specimens: 13.

Genus *Agriotella* Brown

Anterior part of front convex, the margin rimlike and complete (Fig. 9). Thorax more cylindrical with the side margins nearly parallel; lateral pronotal margin joining propleural-prosternal suture in front; prosternal suture broadly excavate in front. Third and fourth tarsal segments felty below at the apices; claws simple.

The species are very similar in general appearance to *Dalopius* spp. or to the smaller species of *Agriotes.* They differ from both genera in the complete margin of the front.

Brown (1933: 179) reviewed the genus.

Key to Species

Each elytron with two yellow spots separated by a broad, transverse, black band, the band as wide as the diameter of the posterior yellow spot; eastern Manitoba ..... 1. *bigeminata* (Rand.)

Yellow areas of elytron more extensive, the transverse band often absent, never as wide as the diameter of the posterior yellow spot; western Alberta ..... 2. *occidentalis* Bn.

1. *Agriotella bigeminata* (Randall) Fig. 60

Length 4.0-5.5 mm. Black; antenna and legs brownish yellow; each elytron black, with two large yellow spots separated by a broad transverse bar; elytral pubescence golden. Pronotal punctures large and shallow, separated by less than their diameters; interspaces not shiny.

Distribution: Whiteshell-Berens River district of eastern Manitoba; on pine and spruce. Specimens: 4.

2. *Agriotella occidentalis* Brown Figs. 58, 59

Length 5.4-6.5 mm. Black; antenna, legs and usually the antero-lateral margin of pronotum reddish yellow; each elytron mostly reddish yellow with dark apex and costal spot, or dark with two large yellow spots separated by a narrow transverse bar; pubescence golden. Pronotal punctures smaller and more widely separated than in *bigeminata* but otherwise similar.

Distribution: Waterton and Lethbridge, northward to Athabasca, eastward to Medicine Hat, Alta. It appears to be a grassland species similar in habits to *Dalopius* spp. Specimens: 8.

Genus *Megapenthes* Kiesenwetter

Anterior part of front convex, more or less helmetlike; margin of front complete, slightly raised (similar to *Ampedus*). Prosternal suture not excavate in front. Elytral striae distinct. Third and fourth tarsal segments felty below; claws simple.

A catalogue and key to the species was published by Van Dyke (1932: 310).

Megapenthes stigmosus (LeConte) Figs. 89-91

Length 5.0-6.0 mm. Black; basal antennal segments, tibiae and tarsi, reddish yellow. Each elytron usually black with an elongate basal spot, a lateral spot at basal third, and a transverse spot at apical fourth; occasionally elytral spots joined and expanded to cover most of the dorsal surface. Pubescence short and moderately dense, yellow or brown. Pronotal punctures shallow and round, separated by about their diameters on the disk but larger and closer at the sides; propleuron punctate.

Distribution: Predominantly poplar forests and parklands from southeastern Manitoba to northwestern Alberta; usually collected on the dense undergrowth. Specimens: 98.

Genus *Ampedus* DeJean

Dorsal surface of head convex in front, the anterior margin more or less complete (Fig. 8). Thorax depressed, wedge-shaped, the sides conspicuously convergent in front; prosternal suture distinctly excavate in front; hind coxal plate wide inside, the free angle rounded or projecting. Tarsal segments and claws simple.

The species live in rotting wood, and many adults appear to stay in the larval tunnels. Other species may be collected on the foliage of evergreen or deciduous trees.

The genus is badly in need of revision. LeConte (1884) reviewed the species under the name *Elater* L.; a number of species have been described since then. Lane (1948: 182) established *Ampedus* DeJean as the correct name for this genus, to replace the misconception of *Elater* L. as used in the Leng catalogue.

Key to Species

1. Hind angle of pronotum with two carinae, the inner strong, the outer inconspicuous; large, brown species with yellow hair ..... 1. *melsheimeri* (Leng)
   Hind angle of pronotum with one carina 2
2. Pronotum entirely red; elytra black ..... 2. *collaris* (Say)
   Pronotum black or bicolored 3
3. Elytra bicolored 4
   Elytra not bicolored 9
4. Elytra black with the basal and lateral margins yellowish ..... 3. *sellatus* (Germ.)
   Elytra red with dark mark on apical half 5

5. Length 5.0-6.5 mm.; apical half to two-thirds of elytra entirely black, the anterior half to third red ..... 4. *pullus* Germ.
Length 8.0-12.0 mm. 6
6. Pubescence of dorsal surface entirely black; elytra reddish brown with the entire apical third covered by a subcordiform black spot ..... 5. *quebecensis* Bn.
Pubescence of dorsal surface yellow or brownish 7
7. Pronotal pubescence very short and appressed, brown; pronotum dull; pronotal punctures shallow, umbilicate, and nearly contiguous ..... 6. *hoppingi* (V.D.)
Pronotal pubescence semi-erect, yellow; pronotum shiny; pronotal punctures not clearly umbilicate, separated by about their diameters 8
8. Cordiform black spots covering apices of elytra; interspaces between pronotal punctures polished ..... 7. *apicatus* (Say)
Elongate cordiform spots not covering apices of elytra; interspaces between pronotal punctures dull except in center ..... 8. *evansi* Bn.
9. Pronotal hair bright yellow or golden, conspicuous 10
Pronotal hair black or brown, not conspicuous 14
10. Elytra wholly reddish yellow, or brown 11
Elytra black 13
11. Length 5.5-7.5 mm.; pronotal interspaces polished, the punctures small and widely spaced 12
Length 10.0-12.5 mm.; pronotal interspaces dull at the sides; pronotal punctures large and shallow, separated by about their diameters on the disk, but much closer at the sides ..... 8. *evansi* Bn.
12. Antenna serrate; third antennal segment triangular, similar to the fourth in form and pubescence; elytral hair yellow; length 6.5-8.0 mm. ..... 9. *sanguinipennis* (Say)
Antenna not serrate; third antennal segment slender, similar to the second in form and pubescence; elytral hair brown or black; length 5.5-6.5 mm. ..... 10. *mixtus* (Hbst.)
13. Length 10.0-12.0 mm.; pronotal punctures moderately large and shallow, separated by less than their diameters on the disk; interspaces dull at sides ..... 11. *luctuosus* (LeC.)
Length 7.5-8.5 mm.; pronotal punctures small and widely spaced; interspaces highly polished; legs usually reddish ..... 12. *subtilis* (LeC.)
14. Length 11.0-12.0 mm.; pronotal surface between punctures finely roughened over entire surface ..... 15. *moerens* (LeC.)
Length 6.5-8.5 mm.; pronotal surface polished in the center 15
15. Antenna serrate; pronotal interspaces dull at the sides ..... 13. *laurentinus* Bn.
Antenna at most feebly serrate; pronotal interspaces entirely polished ..... 14. *nigrinus* (Hbst.)

1. *Ampedus melsheimeri* (Leng)

Length 10.0-11.0 mm. Brown or brownish black. Pubescence long and moderately dense, yellow. Antenna not serrate; fourth segment longer than wide; second segment shorter than third, the two together longer than fourth. Hind angle of pronotum with two carinae, the inner strong and sharp, the outer low and inconspicuous. Pronotal punctures small and shallow, separated by more than their diameters on the disk, closer at the sides; interspaces polished. Elytral intervals flat and polished, finely and sparsely punctulate.

This is the only species in the region with two carinae on the pronotal angles.

Distribution: Sandilands and Whiteshell Forest Reserves, and at Victoria Beach in southeastern Manitoba; on pine. Specimens: 11.

2. *Ampedus collaris* (Say)

Length 7.0-8.0 mm. Black; entire prothorax except sternum red; antenna and legs dark reddish brown. Pubescence sparse, greyish. Antenna strongly serrate, the middle segments as long as wide; second segment shorter than the third, the two together longer than the fourth. Pronotal punctures small, widely spaced on disk; interspaces shiny. Elytral intervals slightly roughened and punctulate.

Distribution: Whiteshell and Sandilands Forest Reserves in eastern Manitoba. Specimens: 6.

3. *Ampedus sellatus* Germar Fig. 94

Length 7.5-10.0 mm. Black; hind angle of pronotum reddish outside carina; elytra black with anterior and costal margins yellow; legs dark brown. Pubescence long and moderately dense, yellow. Antenna serrate; fourth segment three-fourths as wide as long; second segment shorter than the third, the two together longer than the fourth. Pronotal punctures small and round, separated by about their diameters on the disk; punctures at sides larger and shallower, narrowly separated; interspaces polished. Elytral intervals rough, not shiny.

Distribution: Medicine Hat, Alta., to Morden, Man., in the southern part of the Provinces; on cottonwood. Specimens: 11.

4. *Ampedus pullus* Germar

Length 5.0-6.5 mm. Black; elytra black with anterior half to third reddish; antenna and legs reddish brown. Pubescence short and rather sparse, golden brown on pronotum, mostly black on elytra. Antennal segments small, feebly serrate; fourth segment a little longer than broad; second and third segments subequal, together longer than the fourth. Pronotal punctures moderate to very small, separated on the disk by more than their diameters, a little closer at the sides; interspaces polished; propleural punctures deep and surface dull. Elytral intervals shiny.

Distribution: Southeastern Manitoba to Shellbrook and Prince Albert, Sask., and in the Cypress Hills of southern Alberta; on pine and spruce. Specimens: 26.

5. *Ampedus quebecensis* Brown

Length 8.0-8.5 mm. Black; each elytron brownish red, the entire apical third covered by a subcordiform black spot; antenna and legs brown, tarsi paler. Pubescence of dorsal surface entirely black, that on pronotum short and coarse. Antennal segments feebly triangular; fourth segment nearly twice as long as wide; second segment shorter than third, the two together longer than fourth. Pronotal punctures moderate, separated by about their diameters on the disk, closer at the sides; interspaces shiny but not highly polished. Elytral intervals distinctly roughened.

Distribution: Gillam, Man., Waskesiu, Sask. and McMurray, Alta. Specimens: 2 (Alta. and Man. records from W. J. Brown).

6. *Ampedus hoppingi* (Van Dyke)

Length 8.0-10.5 mm. Black; elytra reddish yellow, each elytron with a cordiform spot covering the apical third; antenna and legs brown, the tarsi paler. Pronotal pubescence very short and appressed, golden brown; elytral pubescence somewhat longer, more upright, and more golden. Antenna serrate, the segments small; fourth segment three-fourths as wide at apex as long; second segment shorter than the third, the two together longer than the fourth. Pronotal punctures moderate, separated by about half their diameters on the disk, contiguous at the sides; interspaces shiny on the disk but dull at the sides; propleural punctures very small. Elytral intervals flat, rough.

This species resembles *apicatus* in color.

Distribution: Waterton and Cypress Hills, Alta. Specimens: 5.

7. *Ampedus apicatus* (Say) Fig. 92

Length 9.5-12.0 mm. Black; each elytron reddish with a variable, cordiform black spot covering apex; antenna and legs brown, tarsi paler. Pubescence con-

spicuous, moderately long and dense, golden. Antenna serrate; fourth segment three-fourths as broad at apex as long; second segment shorter than third, the two together longer than fourth. Pronotal punctures moderate, separated by little more than their diameters on the disk, closer at the sides; interspaces polished; propleural punctures large and deep. Elytral intervals a little convex, shiny, sparsely punctulate.

Distribution: Parklands and forests from Whiteshell, Man., to Calgary and Lethbridge, Alta. It has been reared from balsam poplar logs. Specimens: 72.

8. *Ampedus evansi* Brown Fig. 93

Length 10.0-12.5 mm. Black; each elytron yellowish red, usually with a variable dark spot or cloud toward apex but frequently entirely reddish yellow; black spot when present not covering apex of elytron; antenna and legs brown. Pubescence conspicuous, moderately long and dense, golden. Antenna feebly serrate; fourth segment three-fifths as broad at apex as long; second segment much shorter than third, the two together longer than the fourth. Pronotal punctures small to moderate, usually separated by about their diameters on the disk and a little closer at the sides; interspaces shiny on disk, dull at the sides; propleural punctures deep. Elytral intervals flat, punctulate and a little roughened.

This species closely resembles *apicatus* but the elytron is more yellowish, the apices of the elytra are narrowly yellow, the elytral intervals are less shiny, and the pronotum is dull at the sides.

Distribution: From the Whiteshell and Sandilands Forest Reserves in eastern Manitoba, to St. Walburg and Glaslyn, Sask.; on spruce and pine. Specimens: 14.

9. *Ampedus sanguinipennis* (Say)

Length 6.5-8.0 mm. Black; elytra entirely reddish; antenna and legs brown, the tarsi paler. Pubescence moderately long and dense, golden yellow to brownish. Antenna scarcely serrate; fourth segment two-thirds as broad as long; third segment subtriangular and similar in appearance to the fourth, nearly twice as long as the second, shorter than the fourth. Pronotal punctures small, separated by about their diameters on the disk, closer at the sides; interspaces shiny to polished; propleura similar. Elytral intervals distinctly roughened but shiny.

This species is readily distinguished by the clear reddish yellow elytra, the golden pubescence, and intermediate size.

Distribution: Riding Mountain Park, Man. to Waterways and Athabasca, Alta.; on spruce. Specimens: 11.

10. *Ampedus mixtus* (Hbst.)

Length 5.5-7.0 mm. Black; hind angle of pronotum and posterior margin of propleuron usually reddish; elytra reddish brown to brownish black; antenna and legs reddish brown. Pubescence moderately long and dense, golden on pronotum, brown or black on elytra with some yellow at the sides. Antennal segments very small and narrow; fourth segment three-fourths as broad as long, shorter than the second and third together. Pronotal punctures very small and widely spaced; interspaces polished. Elytral intervals flat, slightly roughened, shiny.

This species is variable in elytral color but may be distinguished by the small size, brownish elytra, sparsely punctate pronotum, and very small, narrow antennal segments.

Distribution: Forests and forest margins from Whiteshell, Man. to Whitecourt, Edson, and Rocky Mountain House, Alta., and in the Cypress Hills of southern Alberta; commonly collected on a variety of evergreen and deciduous trees. Specimens: 92.

11. *Ampedus luctuosus* (LeConte)

Length 10.5-12.0 mm. Black; tarsi brown. Pubescence short and dense, golden. Antenna feebly serrate; fourth segment seven-tenths as broad as long; second segment two-thirds as long as the third, the two together longer than the fourth. Pronotal punctures moderate and shallow, separated by less than their diameters on the disk, very shallow and contiguous at the sides; interspaces polished on disk, dull at sides. Elytral intervals rough but shiny.

Distribution: Widespread in predominately poplar forests and parklands in the three Provinces. Specimens: 35.

12. *Ampedus subtilis* (LeConte)

Length 6.5-8.0 mm. Black; antenna and legs reddish brown. Pubescence short and dense, golden. Antenna serrate; fourth segment nearly as broad as long; second and third segments subequal, together longer than the fourth. Pronotal punctures small and shallow, separated by about twice their diameters on the disk, a little closer at the sides; interspaces highly polished. Elytral intervals shiny, punctulate, not roughened.

This species is usually readily distinguished by the reddish brown antenna and legs, and highly polished pronotum. In occasional specimens the legs and antenna are dark brown.

Distribution: Victoria Beach and Winnipeg, Man. to Athabasca and Edson, Alta.; on balsam poplar. It is more common in small groves in the parklands than in the evergreen forests. Specimens: 24.

13. *Ampedus laurentinus* Brown

Length 7.5-8.0 mm. Black; antenna and legs brownish black. Pubescence short and sparse, wholly black on dorsal surface. Antenna serrate, the segments beyond the third short and broad, the intermediate segments broader than long; second and third segments subequal, together longer than the fourth. Pronotal punctures moderate, very shallow, separated by about their diameters on the disk and a little closer at the sides; interspaces shiny but not polished, duller at the sides. Elytral intervals distinctly roughened.

This species is similar in general appearance to *nigrinus* but with dull, more closely punctate pronotum, and serrate antenna.

Distribution: Boreal forests from Victoria Beach and Selkirk, Man., to Whitecourt and Nordegg, Alta.; on aspen poplar. Specimens: 6.

14. *Ampedus nigrinus* (Herbst)

Length 6.5-8.5 mm. Black; antenna and legs brown. Pubescence short and sparse, wholly black on dorsal surface. Antenna hardly serrate, the segments small, slender and symmetrical; fourth segment two-thirds as broad as long; second and third segments subequal, together longer than the fourth. Pronotal punctures small, separated by more than their diameters on the disk, a little closer at the sides; interspaces highly polished. Elytral intervals shiny, a little roughened.

Distribution: Montane, subalpine and boreal forests in the three Provinces; it appears to be more common in western forests than in the east; on pine, spruce and fir. Specimens: 26.

15. *Ampedus moerens* (LeConte)

Length 11.0-12.0 mm. Black; tarsi brown. Pubescence very short and erect, wholly black. Antenna feebly serrate, the segments triangular; fourth segment seven-tenths as broad as long; second segment two-thirds as long as the third, the two together longer than the fourth. Pronotal punctures moderate and shallow, separated by a little less than their diameters on the disk, closer at the sides; interspaces dull. Elytral intervals punctulate and slightly roughened, shiny.

Distribution: Waterton to Kananaskis, Alta.; on poplar and willow. Specimens: 4.

Genus *Cardiophorus* Eschscholtz

Dorsal surface of head nearly flat; anterior margin of front with a complete, raised rim. Thorax tumid, convex above, the sides rounded and lacking the usually ridgelike lateral margin; scutellum heart-shaped. Hind coxal plate very broad inside, the slope abrupt and the free angle approaching 90 degrees. Elytral striae distinct. Tarsi and claws simple.

Blanchard (1889) revised the genus.

Key to Species

1. Posterior margin of propleuron without a distinct emargination or notch next outer angle (Fig. 88) 2
   Posterior margin of propleuron with a distinct emargination or notch next outer angle (Fig. 87) 3
2. Elytra black with yellow spots, or mostly yellow ..... 1. *cardisce* (Say)
   Elytra entirely black ..... 2. *tumidicollis* LeC.
3. Submarginal line of pronotum entirely absent; elytra reddish brown, paler than pronotum ..... 3. *pubescens* Blanch.
   Submarginal line of pronotum present; elytra and pronotum concolorous 4
4. Submarginal line of pronotum extending about one-third way to anterior margin of pronotum ..... 4. *tenebrosus* LeC.
   Submarginal line of pronotum usually extending more than half way to anterior margin 5
5. Pubescence of pronotum and elytra grey or greyish yellow; southwestern Alta. ..... 5. *montanus* Bland
   Pubescence of pronotum and elytra brownish; eastern Manitoba ..... 6. *gagates* Erich.

1. *Cardiophorus cardisce* (Say) Figs. 78-81, 88

Length 6.0-8.0 mm. Black; coxae, trochanters, and tibiae often reddish. Elytra very variable; each elytron black with two yellow spots but the spots frequently much reduced, or often enlarged and continuous to cover the entire surface. Pubescence short and dense, grey or yellowish, frequently golden or brownish on the darker elytral areas. Posterior margin of propleuron without an emargination or notch next outer angle; marginal line reaching more than half way to anterior margin; prosternal spine with impressed lines next margins. Male genital segments are illustrated.

Two, more or less distinct, color variants occur in the study area: a paler form in sandy areas on the prairies (Fig. 78), and a darker form in similar habitats in the forests (Fig. 80). Specimens, intermediate in color pattern to various degrees, occur in the parklands and within artificially planted evergreen groves in the prairies.

The variations appear to be due to climatic or soil influences working on a plastic genetic system, rather than to specific inherited differences. The variation and distribution of the variants or forms parallels a similar variability in the grasshopper *Pardalophora apiculata* (Harris) (Brooks, 1958).

Distribution: Widespread in the forests and grasslands of the three provinces. It prefers fine drifted sand or grass-covered sand dunes. Specimens: 68.

2. *Cardiophorus tumidicollis* LeConte Fig. 82

Length 6.0-7.5 mm. Black. Pubescence short and thin, brownish. Posterior margin of propleuron without an emargination or notch next outer angle; marginal line reaching more than half way to anterior margin; prosternal spine with raised margins. Male genital segments as illustrated.

Distribution: Medicine Hat, Alta. Specimens: 4.

3. *Cardiophorus pubescens* Blanchard Figs. 86, 87

Length 6.5-9.0 mm. Black; posterior margin of propleuron, and legs brown or reddish; elytra wholly reddish brown. Pubescence of upper surface short and dense, grey or pale yellow. Posterior margin of propleuron with an emargination or notch next outer angle; marginal line absent; prosternal spine with feebly impressed lines next margins. Male genital segments as illustrated.

Distribution: Sandy sites in the South Saskatchewan River valley from Lethbridge, Alta., to near Outlook, Sask. Specimens: 11.

4. *Cardiophorus tenebrosus* LeConte Fig. 85

Length 6.5-8.0 mm. Black; tarsi brown. Pubescence short, dense and woolly, greyish or pale yellow. Posterior margin of propleuron with a distinct emargination or notch next outer angle; marginal line extending less than half way to anterior margin; prosternal spine with impressed lines next margins. Male genital segments as illustrated.

Distribution: Mixed prairies throughout the southern half of the area, from MacLeod, Alta., to Carberry, Man. It may be collected on old grass stalks early in May. Specimens: 55.

5. *Cardiophorus montanus* Bland Fig. 84

Length 8.5-10.0 mm. Black; bases of legs and tarsi usually reddish brown. Pubescence short, dense and woolly, greyish white. Posterior margin of propleuron with a distinct emargination or notch next outer angle; marginal line extending more than half way to anterior margin; prosternal spine with impressed lines next margins at base. Male genital segments as illustrated.

In commenting on this species and *tenebrosus* Mr. Lane states (in litt.): "The *Cardiophorus* could very well be new, but they belong to the tenebrosus complex. I would call 'A' *tenebrosus* LeC. and 'B' *montanus* Bland. They are very close to the types of those species, although the first was described by LeConte from San Francisco. The latter was probably from western Montana originally."

Distribution: Lethbridge, Alta. Specimens: 6.

6. *Cardiophorus gagates* Eschscholtz Fig. 83

Length 7.0-8.0 mm. Black; bases of legs usually reddish. Pubescence short and rather scanty, mostly brownish or greyish brown. Posterior margin of pro-

pleuron with a distinct emargination or notch next outer angle; prosternal spine with raised margins. Male genital segments as illustrated.

Distribution: Sandilands Forest Reserve, and Victoria Beach in eastern Manitoba. Specimens: 3.

ADDITIONAL SPECIES

Parallelostethus attenuatus (Say): This large dark species was recorded from Manitoba by Leng (1920: 172). No specimens from a Manitoban locality have been found in the collections examined, and the genus is, therefore, not included in this summary.

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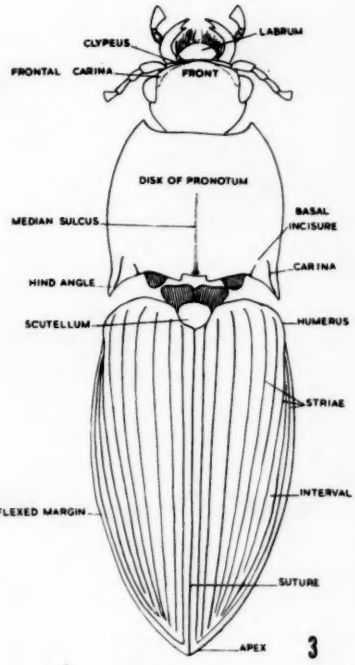

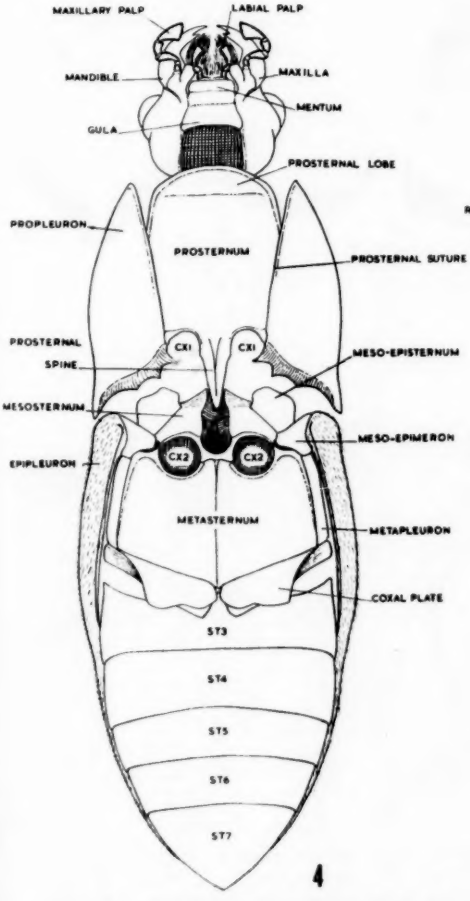

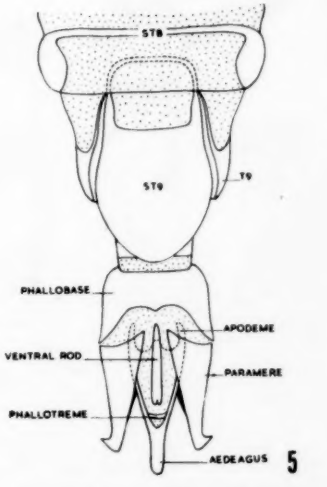

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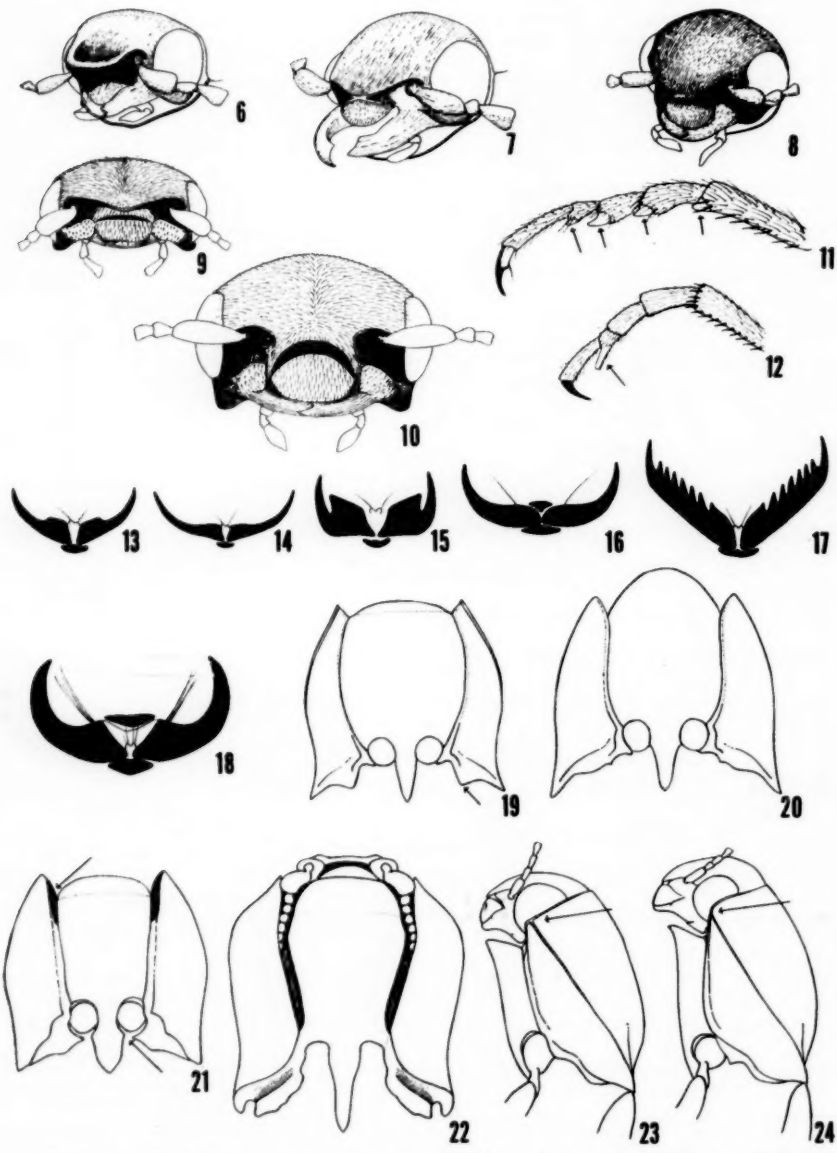

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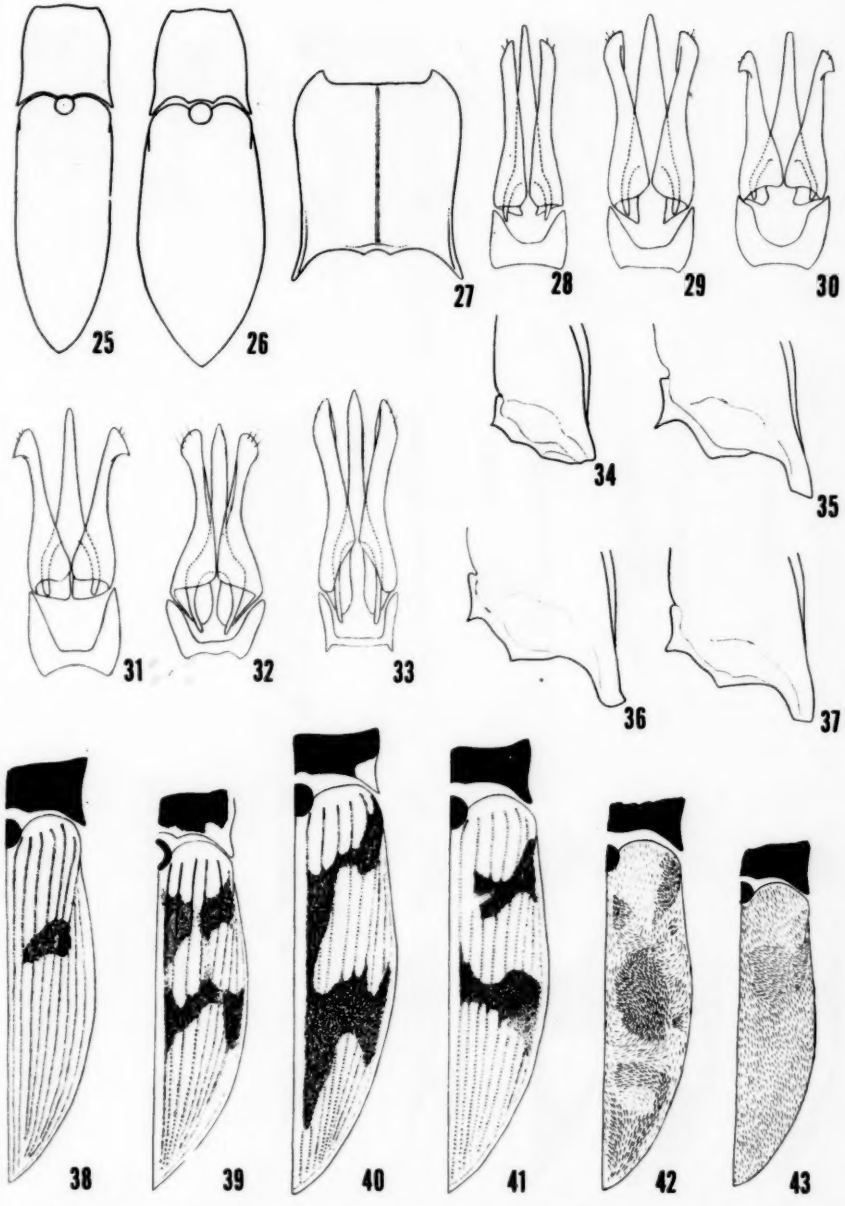

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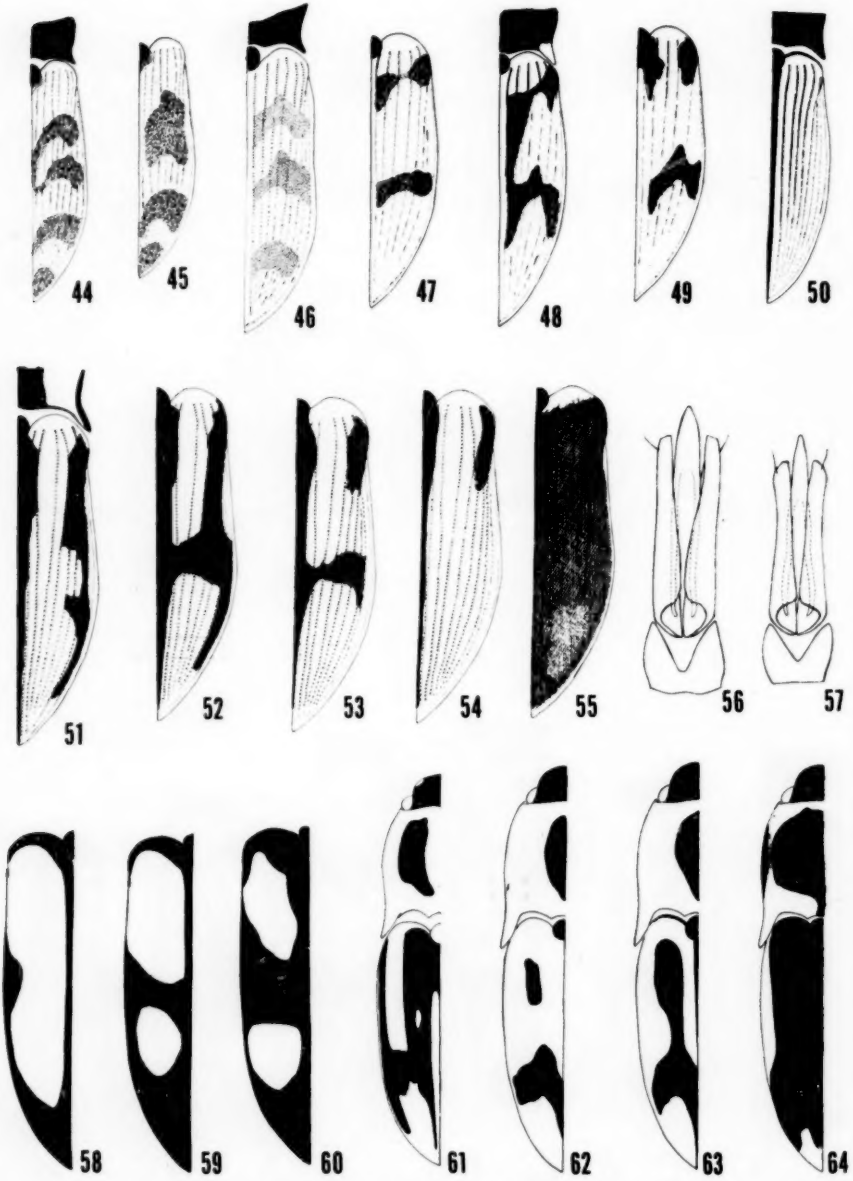

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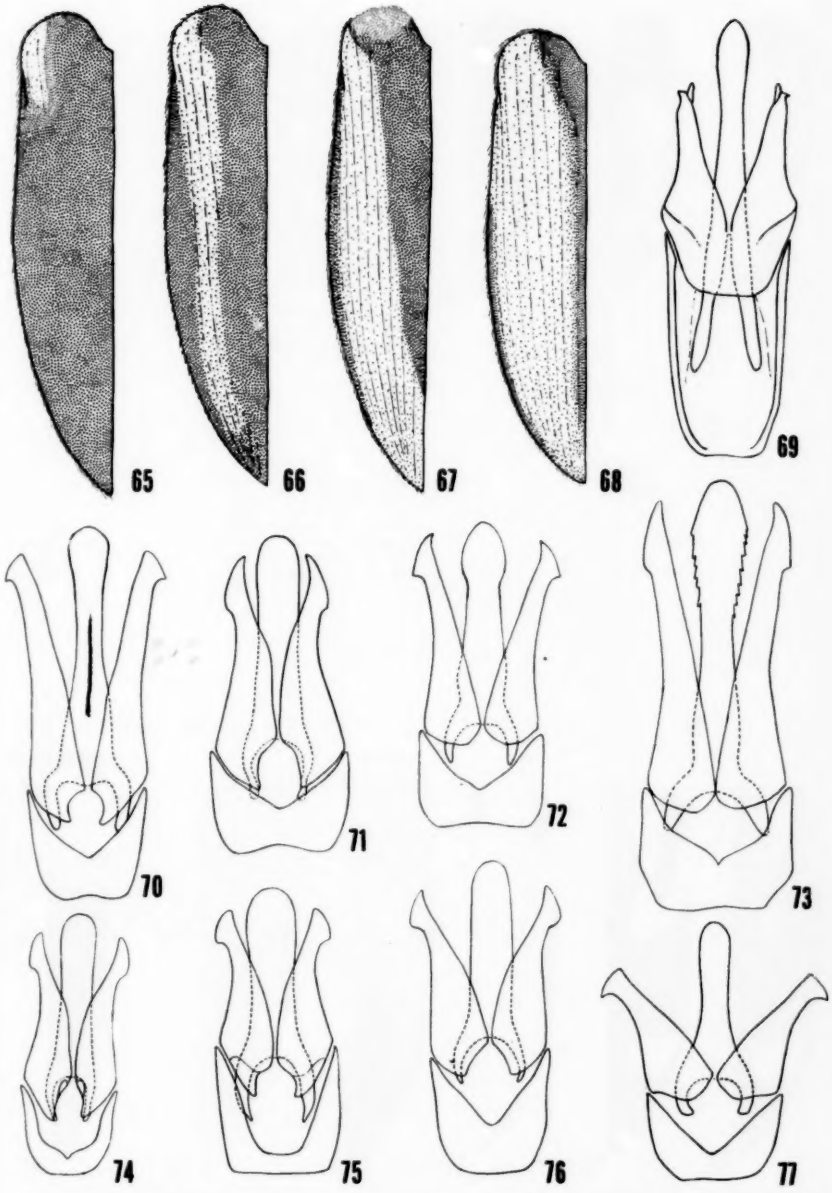

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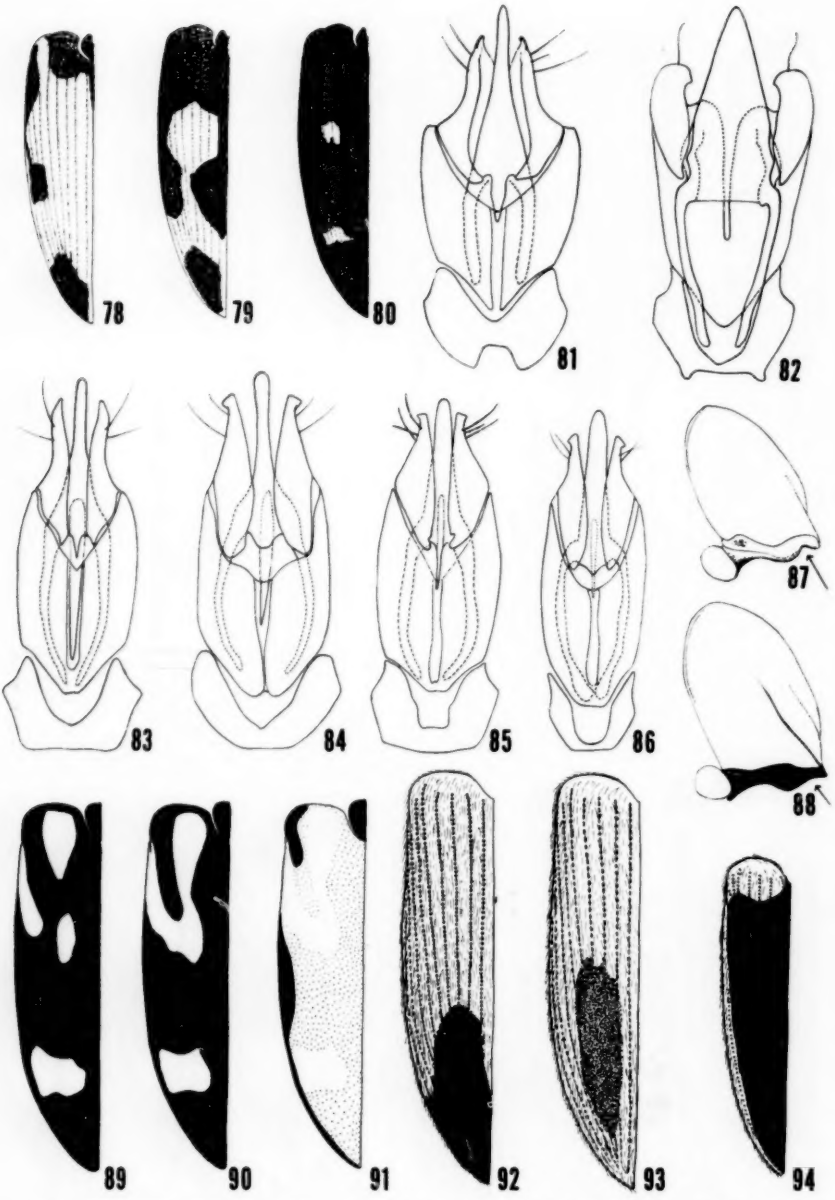

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